JPRS-UES-86-003

19 February 1986

USSR Report

EARTH SCIENCES

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

JPRS-UES-86-003

19 February 1986

USSR REPORT

EARTH SCIENCES

CONTENTS

METEOROLOGY

Calibration of Photoelectric Aerosol Spectrometers
(N.K. Nikiforova; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 8, Aug 85).................. 1

Features of Metrological Support for Lidar Raman Scattering Spectroscopy for Monitoring Atmospheric Pollution
(Ye.K. Ivanov, V.A. Kolvenkov, et al.; IZMERITELNAYA TEKHNIKA, No 5, May 85).................................. 1

Methods in Metrological Support of Laser Sounders for Monitoring Atmospheric Pollution
(D.O. Gorelik, T.M. Yengoyan, et al.; IZMERITELNAYA TEKHNIKA, No 5, May 85).................................. 2

Problems in Monitoring Atmospheric Ozone
(V.I. Butkevich, G.V. Skvortsova, et al.; IZMERITELNAYA TEKHNIKA, No 5, May 85)..................... 3

Radar Aids Typhoon Assessment
(TASS, 9 Aug 85).. 4

Automatic Tsunami Warning System
(TASS, 9 Aug 85).. 5

OCEANOGRAPHY

Finnish-Designed Vessel to Transport Offshore Drilling Rigs
(A. Savchenko; NEDELYA, 21-27 Oct 85).................... 6

Floating Dock Towed from Kerch to Murmansk
(V. Shchetinin; VODNYY TRANSPORT, 24 Oct 85)............. 7

Geological Exploration Ship 'Geolog Fersman'
(V. Yeliseyev; LENINGRADKSYA PRAVDA, 18 Oct 85)........... 8

Expedition Study Ocean-Atmosphere System
(TASS, 28 Aug 85).. 9

'Akademik Kurchatov' Studies Currents, Ice
(DOMESTIC SERVICE, 9 Oct 85)............................. 10

New Computer Oceanographic Data Bank
(DOMESTIC SERVICE, 27 Aug 85)............................ 11

Aided by a Laser
(CINA, 4 Sep 85)... 12

Oceanography Data Bank can Process Satellite Signals
(NTR: PROBLEMY I RESHENIYA, No 9, 17 Sep-7 Oct 1985)...... 13

Trials of Manned Submersible Craft 'Osmotr'
(I. Mogila; TRUD, 22 Nov 85)............................. 14

Comprehensive Studies in Energy-Active Zone of Gulf Stream, Winter 1983-1984 (38th Voyage of Research Vessel 'Akademik Kurchatov' and 5th Voyage of Research Vessel 'Vityaz')
(Yu.A. Shishkov, V.A. Bubnov, et al.; OKEANOLOGIYA, No 4, Jul-Aug 85).. 15

Role of Detritus and Migrating Animals in Feeding of Pelagic Planktonic Fauna of the Boreal and Tropical Pacific Ocean
(A.F. Sazhin; OKEANOLOGIYA, No 4, Jul-Aug 85)............. 16

Feeding of Diaphus Suborbitalis (Myctophidae, Pisces) in Equatorial Indian Ocean
(T.A. Gorelova, V.G. Prutko; OKEANOLOGIYA, No 4, Jul-Aug 85)... 16

Determination of Production of Zooflagellates in Central Indian Ocean
(A.I. Kopylov; OKEANOLOGIYA, No 4, Jul-Aug 85)............ 17

Diurnal Periodicity of Division of Certain Species of Tropical Shelf Planktonalgae
(N.G. Stolbova; OKEANOLOGIYA, No 4, Jul-Aug 85)........... 18

Slow Seismic Waves in Sandy Marine Bottom Material
(V.N. Nikolayevskiy, N.A. Vilchinskaya, et al.; OKEANOLOGIYA, No 4, Jul-Aug 85)......................... 18

Local Variations of Nodules in Clarion-Clipperton Ore Province
(N.S. Skornyakova, V.V. Gordeyev, et al.; OKEANOLOGIYA, No 4, Jul-Aug 85).. 19

One Modification of Ertel Method for Calculation of Turbulent Exchange Coefficients
(T.N. Patsireva; OKEANOLOGIYA, No 4, Jul-Aug 85).......... 20

Study of Vertical Structure of Temperature Variation with Half-Day Tidal Period Using Empirical Orthogonal Functions
(Yu.N. Golubev, L.V. Cherkesov; OKEANOLOGIYA, No 4, Jul-Aug 85)... 20

Some Features of Medium-Scale Structure of Hydrologic Fields in Western Black Sea
(D.I. Trukhchev, Ye.V. Stanev, et al.; OKEANOLOGIYA, No 4, Jul-Aug 85).. 21

Method of Calculating Speed of Large-Scale Currents Based on Density Data
(M.A. Zhdanov, V.M. Kamenkovich; OKEANOLOGIYA, No 4, Jul-Aug 85)... 21

Baroclinic Instability of Large-Scale Current in Vicinity of Polymode Experiment
(Yu.B. Filyushkin; OKEANOLOGIYA, No 4, Jul-Aug 85)........ 22

Effects of Triad Resonant Interactions of Rossby Waves in Ocean
(A.P. Mirabel; OKEANOLOGIYA, No 4, Jul-Aug 85)............ 22

Free Evolution of Barotropic Geostrophic Turbulence
(V.D. Larichev; OKEANOLOGIYA, No 4, Jul-Aug 85)........... 23

Example of Numerical and Laboratory Modeling of Convection Development
(A.V. Bune, S.N. Dikarev, et al.; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 8, Aug 85)....... 23

Numerical Modeling of Evolution of Annular Constant Vorticity Areas
(V.F. Kozlov, V.G. Makarov; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 8, Aug 85)............ 24

Structure and Contemporary Activity of Junction Zone Between Sunda Shelf and Southern China Sea Trench
(R.G. Kulinich, A.I. Obzhirov; TIKHOOKEANSKAYA GEOLOGIYA, No 3, May-Jun 85).. 24

Geological Structure of Magellan Mountains in Pacific
(B.I. Vasilyev, Yu.B. Yevlanov, et al.; TIKHOOKEANSKAYA GEOLOGIYA, No 3, May-Jun 85)............................. 25

Sulfide Ores and Their Relationship to Submarine Volcanoes and Island Arc Hydrotherms
(G.P. Avdeyko, S.G. Krasnov; VULKANOLOGIYA I SEYSMOLOGIYA, No 4, Jul-Aug 85).. 26

Convection Beneath Continents and Oceans
(V.P. Trubitsyn, A.S. Fradkov; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI, No 7, Jul 85)........................ 26

Basic Features of Structure and Morphology of Volcanic Zone and Individual Submarine Volcanoes in the Vicinity of Katuik and Fu-Kuy Islands on Vietnam Shelf Based on Continuous Seismic Profiling Data
(V.I. Bondarenko, A.M. Nadezhnyy; VULKANOLOGIYA I SEYSMOLOGIYA, No 5, Sep-Oct 85).......................... 27

Indirect Effect of Marine Tides on Gravimetric Earth Tides Kapg Stations
(A. Venedikov, M.V. Ivanova, et al.; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI, No 6, Jun 85).................... 27

Allowance for Nonisochronicity of Photochronograph Input Optical System in Registry of Subpicosecond Laser Pulses
(G.V. Kolesov, I.M. Korzhenevich, et al.; IZMERITELNAYA TEKHNIKA, No 5, May 85)................................. 28

Averaged Law of Sound Dimunition in Irregular Near-Bottom Sound Channel
(V.G. Katsnelson, L.G. Kulapin, et al.; AKUSTICHESKIY ZHURNAL, No 4, Jul-Aug 85)............................... 28

Theory of Acoustic Noise in Deep Stratified Ocean
(O.E. Gulin; AKUSTICHESKIY ZHURNAL, No 4, Jul-Aug 85)..... 29

Attenuation of Mean Field During Waveguide Sound Propagation in Ocean with Wave-Covered Surface
(D.I. Abrosimov, L.S. Dolin, et al.; AKUSTICHESKIY ZHURNAL, No 4, Jul-Aug 85).............................. 30

Spatial Coherence and Distribution of Field Intensity in Underwater Acoustic Channel
(S.S. Abdullayev, B.A. Piyazov; AKUSTICHESKIY ZHURNAL, No 4, Jul-Aug 85).. 31

Evaluations of Applicability of WKB Approximation in Normal Waves Method
(A.M. Plotkin; AKUSTICHESKIY ZHURNAL, No 4, Jul-Aug 85)... 31

Dispersion Spreading of Femtosecond Light Pulses in Crystals, Air and Water
(A. Birmontas, V. Vasilyauskas, et al.; KVANTOVAYA ELEKTRONIKA, No 6, Jun 85)............................... 32

Award Nomination for Work on Geology of Atlantic Floor Endorsed
(PRAVDA, 2 Oct 85).. 34

TERRESTRIAL GEOPHYSICS

Instruments that Can 'See Through the Earth'
(MOSCOW NEWS, No 26, 85).................................. 35

Computing Center Warns of Tsunamis
(TASS, 16 Nov 85)... 38

Laser Range Finders, Theodolites Aid Detection of Crustal Movement
(TASS, 11 Nov 85)... 39

Post-Glacial Universal Elevation Slows
(TASS, 28 Aug 85)... 40

Soviet Union Will Drill 22 Superdeep Holes
(TASS, 29 Aug 85)... 41

Discovery in the Field of Earthquake Prediction
(ECOTASS, No 22, 27 May 85)................................ 42

Computer-Aided Earthquake Observations in Far East
(S. Saktaganov; SOVETSKAYA ROSSIYA, 20 Oct 85)............ 43

Economic Weekly Views CEMA Geological Cooperation
(EKONOMICHESKAYA GAZETA, No 41, Oct 85)................... 44

Alma-Ata Laser Device Measures Crustal Movement
(DOMESTIC SERVICE, 22 Aug 85)............................. 46

Chronostratigraphy of Sedimentary Basins on North Bering Shelf
(A.A. Zabolotnikov; TIKHOOKEANSKAYA GEOLOGIYA, No 3, May-Jun 85).. 47

Tectonics and Geological Nature of the Asian-Pacific Ocean Transition Zone
(N.A. Shilo, I.K. Tuyezov; TIKHOOKEANSKAYA GEOLOGIYA, No 3, May-Jun 85)... 47

Seismic Model of Crust in Asian-Pacific Ocean Transition Zone of Kamchatka
(S.T. Balesta, L.I. Gontovaya; VULKANOLOGIYA I SEYSMOLOGIYA, No 4, Jul-Aug 85)........................... 48

Thermogenic Structures and Search Criteria for Latent Hydrothermal Systems Near Petropavlovsk-Kamchatskiy
(Yu.P. Masurenkov; VULKANOLOGIYA I SEYSMOLOGIYA, No 4, Jul-Aug 85).. 49

Thermohydrodynamic Models and their Application to Study of Hydrothermal Systems
(V.A. Voronkov, A.V. Kiryukhin, et al.; VULKANOLOGIYA I SEYSMOLOGIYA, No 4, Jul-Aug 85)......................... 49

Precursors of Volcanic Eruptions
(P.I. Tokarev; VULKANOLOGIYA I SEYSMOLOGIYA, No 4, Jul-Aug 85).. 50

Specifics of Electromagnetic Field of Multiple-Spaced Arrays of Frequency Sounding and Resistivity Detectors Over Horst
(A.N. Kuznetsov; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI, No 7, Jul 85).. 51

Magnetotelluric Soundings at 10^{-3}-10^{4}S in Murmansk Block of Kola Peninsula and Central Karelia
(S.A. Vagin, I.L. Vardanyants, et al.; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI, No 6, Jun 85)........... 51

PHYSICS OF ATMOSPHERE

Possibility of Studying Fine Structure of Spectrum of Particle Sizes by Inversion of Optical Characteristics
(V.D. Bushuyev, I.E. Naats; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 8, Aug 85).................. 52

Numerical Study of Lidar Signal Fluctuations Caused by Large-Scale Atmospheric Aerosol Heterogeneities
(S.A. Gyngazov, S.I. Kavkyanov, et al.; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 8, Aug 85)... 53

Spatial and Temporal Structure of Temperature Field in Atmospheric Surface Layer
(G.V. Azizyan, B.M. Koprov; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 8, Aug 85)........... 53

Resonant Phenomena in Seismoionospheric Interactions
(M.B. Gokhberg, A.M.. Buloshnikov, et al.; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI, No 6, Jun 85)........... 54

Qualitative Methods in Physics of Laser Heating of Metals in Air
(F.V. Bunkin, V.A. Galaktionov, et al.; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA, No 6, Jun 85)................. 54

Bifurcations, Catastrophes and Structures in Laser Thermochemistry
(F.V. Bunkin, N.A. Kirichenko, et al.; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA, No 6, Jun 85).......................... 55

Some Results of Experimental Studies of Ice Cover Mechanical Properties
(V.P. Yepifanov; MEKHANIKA TVERDOGO TELA, No 2, Mar-Apr 85).. 56

ARCTIC AND ANTARCTIC RESEARCH

Deep Antarctic Boring Yields Ancient Samples
(WORLD SERVICE).. 57

IL-14 Planes Determine Arctic Ice Characteristics
(TASS, 23 Aug 85)...................................... 58

Antarctic Researchers
(TASS, 16 Nov 85)...................................... 59

31st Soviet Antarctic Expedition
(DOMESTIC SERVICE, 22 Sep 85).......................... 60

Antarctic Cruise Plans of Research Ships 'Vize' and 'Zubov'
(G. Bregman; VODNYY TRANSPORT, 21 Nov 85).............. 61

Work of Scientific Research Icebreaker 'Shmidt' Described
(V. Pankov; SOVETSKAYA ROSSIYA, 29 Oct 85)............. 62

METEOROLOGY

UDC 551.508.91:621.375.826

CALIBRATION OF PHOTOELECTRIC AEROSOL SPECTROMETERS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian Vol 21, No 8, Aug 85 (manuscript received 6 Dec 83) pp 890-892

NIKIFOROVA, N.K., Experimental Meteorology Institute

[Abstract] A method is suggested for determining a new calibration characteristic of photoelectric aerosol spectrometers d_{eff} (r), allowing calculation of the geometric characteristics of the working volume of the device as a function of particle sizes of aerosol particles present in the air sample being studied. The use of this characteristic in the processing of measurement data can significantly decrease the error in determination of aerosol concentration, in some cases increasing the upper limit of measurable concentration by more than an order of magnitude. Figure 1; references 4 Russian. [10-6508]

UDC 389.14:543.27

FEATURES OF METROLOGICAL SUPPORT FOR LIDAR RAMAN SCATTERING SPECTROSCOPY FOR MONITORING ATMOSPHERIC POLLUTION

Moscow IZMERITELNAYA TEKHNIKA in Russian No 5, May 85 pp 56-57

IVANOV, Ye.K., KOLVENKOV, V.A., KONOPELKO, L.A. and RASTOSKUYEV, V.V.

[Abstract] Lidar Raman scattering spectroscopy is a promising direction in the monitoring of atmospheric pollution. The use of powerful lasers and modern image converters is making it possible to realize the advantages of Raman scattering spectroscopy: the possibility of simultaneous remote monitoring of a large number of polluting components with a single laser with a limit of detection on the order of $1 \cdot 10^{-4}$ with a range 100 m. Raman scattering spectroscopy is therefore especially promising for the monitoring of pollution from factory stacks, highways, etc. The principle for lidar Raman scattering spectroscopy is reviewed. An analysis of the total error in measuring concentration of the component determined by this method reveals that the principal contribution to this error is from systematic errors since

the random components can be decreased with an increase in the number of pulses (sounding time). The greatest contribution to the total error is from components associated with determination of relative atmospheric transmission (transparency) at the lidar and Raman scattering spectroscopy frequencies. These components arise due to unmonitorable changes in atmopsheric transparency along the sounding path. The article gives an evaluation of these error components. The evaluation was made for three wavelengths: $\lambda = 0.266$, 0.532 and 0.694 μm for meteorological ranges of visibility of 5-20 km with allowance for molecular scattering. The large errors make control gas mixtures (in combination with short cells), simulating a polluted path, a poor means for calibration. In calibrating such lidars it is best to employ a method using atmospheric nitrogen or oxygen. Calibration is based on the universality of Raman scattering processes for all chemical compounds making up the atmosphere and on the constancy of the partial pressures of nitrogen and oxygen. The calibration method is described in detail. For calibration of such lidars it is desirable that a data bank be formed of Raman scattering sections for the principal atmospheric pollutants. Tables 2; references 7: 5 Russian, 2 Western.
[384-5303]

UDC 53.089.6:389.14:621.375.826

METHODS IN METROLOGICAL SUPPORT OF LASER SOUNDERS FOR MONITORING ATMOSPHERIC POLLUTION

Moscow IZMERITELNAYA TEKHNIKA in Russian No 5, May 85 pp 49-51

GORELIK, D.O., YENGOYAN, T.M., KOZINTSEV, V.I., KONOPELKO, L.A., MOROZOVA, M.M. and SILNITSKIY, A.F.

[Abstract] A block diagram of the "Elektronika-02" lidar is given and structure and functioning of this instrument (which can be used in monitoring atmospheric pollutants) are discussed in detail. The processing of signals and computation of pollutant concentrations is accomplished automatically using an electronic unit for the registry and processing of data. The principal task in the experimental study of the metrological characteristics of the lidar is a determination of the random component of the measurement error. A program and method for metrological certification were developed for the "Elektronika-02" lidar. Several possible methods for lidar calibration are discussed. The authors found that the best calibration method is computation of the values of an analytical signal both for the atmosphere and for a short cell with allowance for the spectral distribution of laser radiation and the values of the absorption coefficients for nitrogen dioxide for different wavelengths. Specific details of calibration procedures are given in detail. In the course of metrological certification of this lidar the following metrological characteristics were established: range of measurements of concentration of nitrogen dioxide 0.4-10.0 mg/m^3; length of polluted segment of sounding path not more than 200 and not less than 1,000 m for the upper (10 mg/m^3) and lower (0.4 mg/m^3) measurement limits respectively; main reduced error in measuring

nitrogen dioxide not more than 20%; stability and variation of lidar readings not more than 10%; number of measurements which can be averaged automatically, 2-99; time required for a single measurement not more than 20 s. A procedure was also proposed for periodic checking of the lidar during its operation. Figures 1, tables 1; references: 4 Russian.
[384-5303]

UDC 389.14:543.432.23.089.6

PROBLEMS IN MONITORING ATMOSPHERIC OZONE

Moscow IZMERITELNAYA TEKHNIKA in Russian No 5, May 85 pp 46-48

BUTKEVICH, V.I., SKVORTSOVA, G.V. and SHALAMYANSKIY, A.M.

[Abstract] The measurement of atmospheric ozone is presently accomplished on the basis of a number of completely different principles. The spectrophotometric method has the greatest accuracy, but in international comparisons the discrepancies are 5-6%. In order to determine mean annual trends and in solving many other important problems it is necessary to measure total ozone content with a relative error no more than 1%. However, the errors in new measurement methods and methods for calibrating ozonometers are considerably greater. In the USSR total ozone content is measured by instruments having different operating principles and different methods for determining total ozone content. In addition to instrumental errors there are systematic errors which are difficult to determine and compensate, primarily due to a lack of reliable information on the absorption spectrum of ozone in a wide range of pressures and temperatures. The authors have attempted solution of such problems by laboratory modeling of measurement conditions. This was done using a light source having a spectral distribution of the density of radiation in the working range 290-350 nm. The atmospheric layer is simulated in a cell placed between the light source and the ozonometers to be certified. A block diagram (with 22 components identified) of the unit for calibrating spectral ozonometers is given and discussed in detail. Particular attention was given to measurements of absorption coefficients at a wavelength of 253.7 nm; pertinent data are tabulated. It is shown that the WMO requirements on the accuracy of certification and calibration of ozonometers can be met by using a measurement system based on the UV absorption method. Its realization is dependent primarily on the precise and certified value of the ozone absorption coefficient at the wavelength of the used light source, in particular, of the mercury line 253.7 nm. Figures 1, tables 1; references 18: 16 Russian, 2 Western.
[384-5303]

RADAR AIDS TYPHOON ASSESSMENT

Moscow TASS in Russian 0926 GMT 9 Aug 85

[Text] Kharkov. A unique radar, which has been designed by scientists at the Kharkov Institute of Radio Physics and Electronics of the Ukrainian Academy of Sciences, makes it possible to spot the birth of a typhoon from space, to calculate its power and direction. With the help of the radar, which has been installed on board the Soviet satellites Cosmos-1500 and Cosmos-1602, it is possible to assess the strength of a typhoon and take precautionary steps in good time.

According tc Anatoliy Kalmykov, who is in charge of the work, "the radar can survey a strip as wide as 500 km. This means that we can observe the entire structure of a typhoon. Photographs clearly show, for example, the so-called "eye" of a typhoon--an area of motionless water in the center, with winds raging about it. The gigantic whirlwind races along with the speed of an express train. It is very important to assess the power of the hurricane speedily and accurately. The space radar system which has been designed at the institute can do this."

The scientist disclosed that the system is based on the laws governing the reflection of radio waves from the ocean surface. The strength of the wind and the power of the hurricane are measured by the height of the wave. Darkness and cloud cover are no handicap to the radar--it can make out objects with a size of about one kilometer. The system can be applied in a very wide variety of economic spheres. It has been used successfully to convoy ships through ice on the Northern Sea Route and in experiments to determine the limits of spring river flooding and the structure and composition of agricultural crops.

Anatoliy Kalmykov noted that the abilities of the radar system have been highly praised by scientists from the USA, Canada and other countries. They have asked to be allowed to share in the information which has been gained. "We never turn anybody down, because we think cooperation in space should be just like that, peaceful--to the benefit of all mankind," the Soviet scientist said in conclusion.

/9716
CSO: 1865/452

AUTOMATIC TSUNAMI WARNING SYSTEM

Moscow TASS in Russian 0926 GMT 9 Aug 85

[Text] Vladivostok. An integrated automated system for round-the-clock observation of the origination and propagation of Tsunami waves is being set up on the Pacific coast of the USSR. The system will speedily and timely warn the population of the Soviet Union and the other countries of the basin about the threat. It is to be put into operation by the year 1990.

The creation of the world's first system of this kind is due to research and practical testing of many years, which enabled Soviet scientists to study carefully underwater quakes causing destructive waves, to learn to distinguish them from other oceanic distortions arising as a result of flood tides and storm waves, which in the past caused false alarms. Bottom cable hydrophysical stations have been tested off the islands of the Kuriles. A survey map of Tsunami danger of the Kurile Islands and Kamchatka Peninsula has been compiled. It is soon to be prepared for Sakhalin Island and the Primorye territory.

/9716
CSO: 1865/452

FINNISH-DESIGNED VESSEL TO TRANSPORT OFFSHORE DRILLING RIGS

Moscow NEDELYA, 21-27 Oct 85, No 43 (1335), p 5

[Article by A. Savchenko, (Vyborg)]

[Text] The Vyborg Shipbuilding Plant has begun building semisubmerged drilling rigs for operation on the coastal shelf.

Each rig is 100 meters tall and 70 meters wide. Its giant "floats" will hold more than 12,000 tons on the water. In short, the "Shelf" is an impressive structure. But how is it to be delivered to its worksite? Shipbuilders of Finland's "Wartsila" joint-stock company have proposed a vessel which will be capable of taking the "Shelf" on board its deck. Imagine a vessel lowering itself 20 meters in the water, maneuvering its deck platform under the "Shelf", and then rising in the water again. Such a vessel will be ready in a year.

(A photograph was given showing a model of the vessel, which has a giant crane at the stern.)

FTD/SNAP
/9716
CSO: 1865/53

FLOATING DOCK TOWED FROM KERCH TO MURMANSK

Moscow VODNYY TRANSPORT, 24 Oct 85 p 1

[Article by V. Shchetinin, (Murmansk)]

[Text] The icebreaker "Yuriy Lisyanskiy" and the seagoing salvage and rescue vessel "Kapitan Fedotov" have delivered a floating dock with a lifting capacity of 5,000 tons from Kerch to Murmansk. This dock is 134 meters long, 31 meters wide, and has a draft of 1.87 meters. The convoy's voyage from the Black Sea to the Barents Sea took place in very difficult navigational and weather conditions of the onset of autumn. Representatives of the Arctic Offshore Oil-and-Gas Industry Fleet, to which the dock was consigned, received it without complaints and expressed gratitude to the vessels' crews for carrying out this important assignment precisely on schedule.

FTD/SNAP
/9716
CSO: 1865/53

GEOLOGICAL EXPLORATION SHIP 'GEOLOG FERSMAN'

Leningrad LENINGRADSKAYA PRAVDA, 18 Oct 85 p 1

[Article by V. Yeliseyev]

[Text] A new seagoing geological exploration vessel, the "Geolog Fersman," has docked in the Leningrad seaport.

The vessel was built by shipbuilders of the city of Nikolayev. It has a displacement of 5,800 tons; it is 104 meters long and 16 meters wide. Its two main diesel engines have a total capacity of 7,000 horsepower and makes it possible to develop speeds as high as 16 knots. The vessel is equipped with a satellite navigation system for ensuring safe sailing.

The new vessel is intended for exploring the mineral resources of the world's oceans. A special complex allows investigations to be conducted at depths as great as 6,000 meters.

The ship carries a crew of 54 seamen. A scientific expedition can work on board it in addition to the crew. V.G. Nosenko, captain of the "Geolog Fersman," reported that its first departure to sea for the purpose of testing its equipment and instruments is scheduled for November 20.

FTD/SNAP
/9716
CSO: 1865/91

EXPEDITIONS STUDY OCEAN-ATMOSPHERE SYSTEM

Moscow TASS in English 28 Aug 85

[Text] The purpose of the studies initiated by Soviet scientists into short-term climate fluctuations is to help expand human economic activity.

It is the Soviet Union's largest program to study the relationship between the atmosphere and the ocean, journalists were told at the Soviet Oceanographic Institute. It is based on research done by Soviet Academician Guriy Marchuk in the mid-1970s on compiling weather forecasts for 1-3 months. Carrying out those studies, scientists took note of an important physical aspect of the ocean-atmosphere system: individual areas (zones) of the ocean have stable links with the condition of the atmosphere over vast expanses of the globe.

These key zones, which constitute small localized sources of heat and in which heat exchange between the atmosphere and the ocean are especially intensive, have come to be known as the energy-active zones (areas) of the world ocean.

Seasonal observations are now carried out by expeditions in areas with the maximum extent of 1,500 by 2,000 kilometers in five energy-active zones. These are the Norwegian-Greenland energy active zone, the Newfoundland energy active zone, the Gulf Stream energy active zone, the Tropical Zone of the Atlantic and the energy-active zone of the Kuroshio Current.

Findings are processed in a way making it possible to obtain concerted and quantitatively authentic characteristics of seasonal changes in water temperature, air temperature, heat content of the upper layer of the ocean, heat currents from the ocean into the atmosphere and heat and salt currents into the deeper layers of the ocean.

It is clear already now that the results of observations under the program will substantially alter our ideas of the dynamics of the ocean.

/9716
CSO: 1865/28

'AKADEMIK KURCHATOV' STUDIES CURRENTS, ICE

Moscow DOMESTIC SERVICE in Russian 0700 GMT 9 Oct 85

[Text] The results of the scientific research by the expedition, which has returned to Kaliningrad aboard the scientific research vessel "Akademik Kurchatov", will help polar workers, climatologists and fishermen in their work. The main aim of the voyage to arctic latitudes, with scientists of the "Shirshov" Institute of Oceanology of the USSR Academy of Sciences taking part, was to study physical-chemical processes arising where the Gulfstream warm current and the water of the Arctic Ocean meet. The materials gathered will serve as the basis for compiling long-term forecasts of the weather and of the ice and fishing situation in this area of the world ocean.

/9716
CSO: 1865/80-E

NEW COMPUTER OCEANOGRAPHIC DATA BANK

Moscow DOMESTIC SERVICE in Russian 0700 GMT; 0801 GMT, 27 Aug 85

[Text] A computer data bank for the oceanography of the Pacific and Indian Oceans has been brought into operation at the Automation and Control Processes Institute in the USSR Academy of Sciences' Far Eastern Scientific Center. All the information on the enormous water expanses gathered on scientific expeditions starting frcm 1985 [a later broadcast gives this date as 1885] is recorded on magnetic disks. In a century more than 4,000 journeys have been made in which 3,500 million measurements have been made. However, the computer data bank is not simply an enormous storehouse for all sorts of data on temperature, salinity, chemical composition of the oceans' waters; it is a complicated program system with the aid of which it is possible to study the life of the ocean's biodynamics to conduct research on the laws governing it.

Apart from this it will make it possible to plan the work of expeditions on vessels of the scientific fleet. The data bank is also adapted to the reception and processing of signals from artificial earth satellites. Using the data received from space it is possible to more precisely produce temperature charts of the surface of the water, which is very important for fishermen and seamen.

/9716
CSO: 1865/26

AIDED BY A LASER

Riga CINA in Latvian 4 Sep 85 p 2

[Text] Armenian SSR. An original device, capable of concentrating a laser beam at a prescribed depth in a body of water, was developed by workers at the Sevan hydrobiological station of the Academy of Sciences along with workers from the "Aerosol" design bureau in Yerevan.

An experiment was performed with this laser device, which was installed in a helicopter, to determine from afar the volume of phytoplankton (a single-cell aquatic plant organism) in the high-mountain Lake Sevan.

This was necessary in order to precisely determine the lake's food production this year and to provide appropriate direction to the fish combines regarding the volume limit of the fish harvest. At river estuaries the colored water plants will help determine which industrial enterprises dumped untreated waste water into the lake.

Such an experiment also will be performed on Lake Ladoga, where the problems are similar to those in Lake Sevan.

/9716
CSO: 1865/95

OCEANOGRAPHY DATA BANK CAN PROCESS SATELLITE SIGNALS

Moscow NTR: PROBLEMY I RESHENIYA, 17 Sep-7 Oct 1985, No 9, p 2

[Excerpt] A computer data bank "Oceanography: Pacific and Indian Oceans" has been put into operation at the Institute of Automation and Control Processes of the USSR Academy of Sciences' Far East Research Center.

The computer bank is not just a repository of all kinds of data on the temperature, salinity and chemical composition of the oceans. It is a complex program system, by means of which one can study the ocean in dynamic conditions and investigate the laws affecting it. In addition, the data bank makes it possible to plan the work of expeditions on ships of the scientific fleet.

Thus far, information obtained only by the method of 'contact' measurements is being stored in the new data bank, but it is also equipped for receiving and processing signals from earth satellites. With the aid of data obtained from space, more accurate temperature maps of the water surface can be produced. This is very important for fishermen and mariners. On the Far East research ship "Akademik Korolev," trials of an on-line data bank are now under way, the purpose of which is to do primary processing of information directly during the voyage.

FTD/SNAP
/9716
C[illegible]O: 1865/53

TRIALS OF MANNED SUBMERSIBLE CRAFT 'OSMOTR'

Moscow TRUD 22 Nov 85 p 4

[Article by I. Mogila]

[Excerpt] A unique manned submersible craft, the "Osmotr," has successfully passed its initial trials in Gelendzhik. This craft was developed by the design and experimental bureau of the USSR Academy of Sciences' Institute of Oceanology.

"The 'Osmotr' is intended for exploration in coastal-shelf zones of the ocean," related Anatoliy Mikhaylovich Sagalevich, head of the Oceanology Institute's laboratory of deep-diving manned submersible craft. "It is an independent craft. It can travel under water at a speed of 1.5 knots and descend to depths as great as 300 meters. Most importantly, researchers with scuba-diving gear can leave the craft and return to it at great depths, through a special lock."

The trials which took place recently in Golubaya Bay are only one stage of a large comprehensive program for the study of ocean depths with the aid of manned submersibles developed at the Oceanology Institute. The scientists also have at their disposal two "Pisces" craft that are capable of descending to depths as great as 2,000 meters, and an "Argus" craft (600 meters).

The scientific research craft "Osmotr" has passed its initial trials, and now it must be readied for dives next summer. The "Pisces" craft must also be readied by then. Hydronauts will make a number of dives with them in the Pacific Ocean for the purpose of finding and studying outflows of geothermal water on the ocean floor.

FTD/SNAP
/9716
CSO: 1865/91

COMPREHENSIVE STUDIES IN ENERGY-ACTIVE ZONE OF GULF STREAM, WINTER 1983-1984 (38th VOYAGE OF RESEARCH VESSEL 'AKADEMIK KURCHATOV' AND 5th VOYAGE OF RESEARCH VESSEL 'VITYAZ')

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85, pp 706-709

SHISHKOV, Yu. A., BUBNOV, V.A. and ARSENYEV, V.S.

[Abstract] In late 1983, the Institute of Oceanography imeni P.P. Shirshov, USSR Academy of Sciences, sent an expedition consisting of the two research vessels mentioned in the title into the Northwest Atlantic. The main purpose of the expedition was to undertake comprehensive studies in the energy-active zone of the Gulf Stream. Furthermore, the 'Akademik Kurchatov' after completing these studies was to pick up a group of Cuban oceanographers and undertake joint hydrologic studies in the economic zone of the Republic of Cuba in the Florida Straits and Gulf of Mexico. The main purposes of the studies were to investigate heat and moisture exchange with the atmosphere, the synoptic structure and variability of thermodynamic and hydrodynamic fields in the ocean in the Gulf Stream and its eddies, variability of aerophysical fields, energy exchange across the Gulf Stream related to the development and propagation of hot and cold eddies, and improvement and testing of a numerical model of the hydrologic structure of the ocean. The joint expedition of these two ships was the first experiment in large-scale hydrologic and meteorological investigations in the energy-active zone of the Gulf Stream in winter and resulted in the collection of rich factual material.
[17-6508]

UDC 577.475.551.46

ROLE OF DETRITUS AND MIGRATING ANIMALS IN FEEDING OF PELAGIC PLANKTONIC FAUNA OF THE BOREAL AND TROPICAL PACIFIC OCEAN

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 5 Jan 84) pp 685-691

SAZHIN, A.F., Oceanology Institute imeni P.P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] An estimate is made of the magnitude and composition of the flow of detritus from the epipelagial zone into deeper waters, as well as the role of this detritus flux and of migrating animals in supplying food to deep-water fauna. The concentration of detritus was defined as the difference between particles formed and utilized in the surface layers. The detritus is consumed by bacteria, protozoa and mesoplankton animals, fine and coarse filterers and euryphages. At 20°C water temperature, bacteria reach their maximum number on dead organic matter falling through the water by the end of one day, by which time less than 10% of the initial quantity of phosphorus, and 6-7% of protein is left in the descending detritus. Liberation of ammonia nitrogen reaches its maximum by the end of the first day and is practically completed by the fourth or fifth day. A significant portion of detritus is thus decomposed in the euphotic zone. In the deep zone even though the flow of detritus is intense, its food value is slight, and the plankton is predominantly composed of carnivorous forms oriented toward food with higher energy value. Figures 2; references 51: 20 Russian, 31 Western.
[17-6508]

FEEDING OF DIAPHUS SUBORBITALIS (MYCTOPHIDAE, PISCES) IN EQUATORIAL INDIAN OCEAN

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 29 Jun 84) pp 677-684

GORELOVA, T.A. and PRUTKO, V.G., Oceanology Institute imeni P.P. Shirshov, USSR Academy of Sciences, Moscow; All-Union Scientific Research Institute of Marine Fishing and Oceanography, Moscow

[Abstract] Results are presented from studies of the composition of the diet of D. Suborbitalis during various seasons in the western equatorial Indian Ocean over the slopes of the Equator seamount at depths as great as 1000 m. Specimens were caught in March-June 1980, late winter and summer. Specimens were taken from a commercial trawl operating at 40-200 m depth, primarily at night. Visual evaluation of stomach contents on a 5-point scale was used for over 1000 specimens, with 673 specimens studied in the laboratory. The feeding spectrum was composed by reconstructing weights of food specimens grouped as follows: Copepoda, Pisces, Amphipoda, Chaetognatha, Euphausiacea, Decapoda and 'other,' including Appendicularia, Ostracoda, Heteropoda, Pteropoda,

Salrae and Medusae. Fish scales were found in the stomachs of some 60% of the fish. Copepoda and fish make up the main food sources of D. Suborbitalis, Euphausiacea significantly less, all other groups amounting to a total of 15% of the total food mass. Copepoda make up the main mass of food of smaller specimens, fish and less frequently shrimp making up the main mass of fish over 50 mm in length. No significant variation in stomach contents was observed over the length of the study. Figures 3, tables 3; references 20: 7 Russian, 13 Western.
[17-6508]

UDC 591.524.12

DETERMINATION OF PRODUCTION OF ZOOFLAGELLATES IN CENTRAL INDIAN OCEAN

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 12 Sep 83) pp 673-676

KOPYLOV, A.I., Southern Division, Oceanology Institute imeni P.P. Shirshov, USSR Academy of Sciences, Gelendzhik

[Abstract] An attempt is made to determine the rates of reproduction and production of zooflagellates in the open ocean. Studies were performed during the 25th voyage of the research vessel 'Dmitriy Mendeleyev' in September-October 1980 in the Indian Ocean, samples taken in a 7-liter plastic bathometer and removed from the bathometer with a short, broad glass siphon to avoid damage. Specimens were counted at 125 X magnification in 10 to 100 visual fields, as well as flagellates adhering to phytoplankton cells and particles of detritus. It was found that the time of generation of zooflagellates in the surface horizon of the Central Indian Ocean varied from 24 to 48 hours. Times were longest in the area of the equatorial divergence, shorter near the trade currents, varying with the concentration of bacterioplankton at the time of observation. Production varied from 0.5 to 10.6 mg/m^{-3}. No reproduction was observed at 120 m or deeper. Figure 1, tables 3; references: 11 Russian.
[17-6508]

UDC 576.353:582:252(262.5)

DIURNAL PERIODICITY OF DIVISION OF CERTAIN SPECIES OF TROPICAL SHELF PLANKTONALGAE

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 19 Sep 83; after revision 6 Mar 84) pp 664-668

STOLBOVA, N.G., Institute of Biology of the Southern Seas, Ukrainian Academy of Sciences, Sevastopol

[Abstract] A study is presented of the diurnal rhythms of mitosis in certain species of diatomaceous algae and dinoflagellates on the shallow Atlantic tropical shelf. Materials were collected at 9°24'N, 13°49'W on 29-30 January 1982. Tides caused depth at the station to vary from 14 to 18 m, salinity 3.42-3.48 0/00, water temperature at the surface 26.9-27.4°C. One vertical sampling of the water from bottom to surface was taken each 3 to 3.5 hours by hoisting a net. The frequency of mitosis was analyzed in preparations stained with 2% acetoarsine. Large species present in great numbers were selected, including Thalassiothrix Frauenfeldii (Grun), Rhizosolenia imbricata v. Schrubsolei (Schroeder), Biddulphia sp. and several species of Ceratium. A diurnal periodicity is found to be coordinated among an entire community, with the diurnal maxima of division varying from species to species, shifted in time relative to each other, facilitating more uniform distribution of dividing cells throughout the day. The diurnal periodicity is related to the major functional parameters of the population, the rate and synchronism of division. The periodicity is not related to the tides. Figures 4; references 19: 4 Russian, 15 Western.
[17-6508]

UDC 551.465

SLOW SEISMIC WAVES IN SANDY MARINE BOTTOM MATERIAL

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 13 Jul 83, after revision 19 Dec 84) pp 656-663

NIKOLAYEVSKIY, V.N., VILCHINSKAYA, N.A. and LISIN, V.P., Earth Physics Institute imeni O. Yu. Shmidt, USSR Academy of Sciences, Moscow; All-Union Scientific Research Institute of Marine Geology, Riga

[Abstract] Available materials on marine seismoacoustics were analyzed and special experiments were performed in open and littoral portions of the Pechora and Baltic Seas, the Kama Reservoir and under laboratory conditions in order to determine mechanisms of generation of low frequencies under practical conditions. The experiments utilized ultrasonic waves at 25-150 KHz, seismic wave frequencies generated by an electric spark source with multiple-electrode acoustical signal radiator, a pneumatic source, a 24-kg falling weight, a pulsed reactive surface-type source and a 40 g powder charge, producing

oscillations from 10 Hz to 150 KHz with bottom material loads of 10^{-3} to 10kg/cm^2, forces of less than 1 N to 10^3 N. For the first time, dynamic second-order repacking waves are observed under natural conditions in a slow surface wave at the interface between free liquid and saturated heterogeneous soft bottom material. Figures 4, tables 1; references 24: 17 Russian, 7 Western.
[17-6508]

UDC 552.124.4:553(265/266)

LOCAL VARIATIONS OF NODULES IN CLARION-CLIPPERTON ORE PROVINCE

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 5 Jul 83, after revision 11 Nov 83) pp 630-637

SKORNYAKOVA, N.S., GORDEYEV, V.V., ANIKEYEVA, L.I., CHUDAYEV, O.V. and KHOLODKEVICH, I.V., Oceanology Institute imeni P.P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] A study is made of local variations in productivity, morphology and composition of nodules and their correlation with the facial situation of ore formation based on the materials of two series of observations made on the 28th voyage of the 'Dmitriy Mendeleyev' in the radiolarian belt of the ocean in the Clarion-Clipperton ore province southeast of Hawaii. Macroscopic and microscopic studies of nodules were performed, their productivity and concentration determined, and diffractometric and chemical analyses were undertaken. The first area covered a hilly plain with depths of 300 to 600 m at 9°31.4'N, 152°40.3'W. The second area was primarily on the surface of a slightly hilly plain at 10°02.4'N, 146°29.4'W, depth 5050-5250 m. In this area, large asymmetrical nodules are found. In the nodules from the globular lower to the smooth upper surface the content of Mn, and particularly Ni, Cu and Zn and the Mn/Fe ratio decrease. The diagenetic and sedimentation-diagenetic nodules of the area are typical for a radiolarian zone with elevated Mn/Fe ratio and the content of Cu, Ni and Zn is 1.5-2.5 times as great as in nodules from the first area. The Mn/Fe ratio is usually greater than 4, with values of 2.5-3.5 found in biomorphous nodules from the tops of the hilly rises. The ratios of mobile forms of the trace elements with Mn and Fe were calculated, showing stable Cu/Mn, Zn/Mn, Ni/Cu, Co/Mn and Co/Fe ratios within both areas, variation factors 7-20% with some enrichment in the sediment of area two in copper, and to a lesser extent in nickel. Figures 3, tables 3; references 12: 4 Russian, 8 Western.
[17-6508]

UDC 551.465(269)

ONE MODIFICATION OF ERTEL METHOD FOR CALCULATION OF TURBULENT EXCHANGE COEFFICIENTS

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 23 Sep 83) pp 593-596

PATSIREVA, T.N., Marine Studies and Oceanology Institute, Bulgarian Academy of Sciences, Varna

[Abstract] The Ertel method is based on determining the turbulent viscosity coefficient by means of the Prandtl hypothesis. Equations are suggested for calculating horizontal turbulent exchange tensor components on the basis of Euler correlation functions using the Prandtl hypothesis and determination of mixing paths by methods similar to the Ertel method. The exchange coefficients calculated by the Ertel method and the suggested variant are compared. Tables 1; references: 5 Russian.
[17-6508]

UDC 551.465.5(261.5)

STUDY OF VERTICAL STRUCTURE OF TEMPERATURE VARIATION WITH HALF-DAY TIDAL PERIOD USING EMPIRICAL ORTHOGONAL FUNCTIONS

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 3 Oct 83, after revision 3 Feb 84) pp 587-592

GOLUBEV, Yu.N. and CHERKESOV, L.V., Marine Hydrophysics Institute, Ukrainian Academy of Sciences, Sevastopol

[Abstract] The practical significance of the empirical orthogonal functions method is that the random geophysical field it is used to study is represented as a sum of modes characterizing the time and space changes in the studied process. The method allows estimation of absolute and relative contributions of each mode to the initial set of observations. This article applies the method to the study of the vertical profile of temperature changes along Ampere Bank, which have a semidiurnal tidal period. It is found that the vertical temperature distribution as well as its time course can be represented by two or three empirical orthogonal function modes. The maximum dispersion of temperature fluctuations for all deep-water stations occurs in the upper 100 meters. This maximum results primarily from the contribution of the first empirical orthogonal function, the specific share of the second and third modes increasing at over 100 m depth. Significant horizontal nonuniformity in vertical fluctuation energy is observed over the rise, possibly as a result of interaction between the semidiurnal period of the tide and the bank. Figures 4, tables 1; references 8: 7 Russian, 1 Western.
[17-6508]

UDC 551.465

SOME FEATURES OF MEDIUM-SCALE STRUCTURE OF HYDROLOGIC FIELDS IN WESTERN BLACK SEA

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 31 Jan 84, after revision 16 Nov 84) pp 572-577

TRUKHCHEV, D.I., STANEV, Ye.V., BALASHOV, G.D., MILOSHEV, G.D. and RUSENOV, V.M., Marine Studies and Oceanology Institute, Bulgarian Academy of Sciences, Varna; Sofia University imeni Kl. Okhridskiy; Regional Hydrometeorology Administration, Bulgarian Academy of Sciences, Varna

[Abstract] The authors undertook quasi-synchronous geologic surveys on board the Bulgarian research vessel 'Issledovatel' from 3 through 7 August 1981 in order to study large- and medium-scale hydrophysical field structures in an area to the west of 29°30'E and between 42°25' and 43°30'N. The distance between measurement stations in the littoral zone averaged 7.5 nautical miles, in the deep water area the measurements were performed each 10 to 15 miles, shorter than the characteristic internal radius of deformations for the area. The eddy structure of temperature, salinity and velocity fields is analyzed, revealing a vertically stratified eddy structure both in shelf and deeper areas. Diagnostic calculations performed using the Sarkisyan quasi-geostrophic model show a significant difference between hydrodynamic modes on the shelf and in deep-water zones. A cyclonic eddy is characteristic, manifested at the sea surface as a meander in the main Black Sea Current. The cyclone is found to separate from the main current with the thermohaline characteristics of open sea water. Barotropic and baroclinic instability of the current are found to be important in the formation of Black Sea eddies. Figures 3; references 8 Russian.
[17-6508]

UDC 551.465

METHOD OF CALCULATING SPEED OF LARGE SCALE CURRENTS BASED ON DENSITY DATA

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 9 Jul 84) pp 568-571

ZHDANOV, M.A. and KAMENKOVICH, V.M., Oceanology Institute imeni P.P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] Reliable estimates of the climatic density field apparently can be obtained only in certain limited regions of the ocean. There is therefore interest in developing indirect methods to calculate the velocity field of large-scale climatic currents in individual regions of the ocean using information on the density field only within a single region. One such method is suggested in this work, a natural extension of the method of Stommel and Schott (Deep-Sea Research, Vol 24, No 3, 1977, pp 325-329). Calculation examples are

presented. The method presented in this work differs in the method used to analyze a predefined system of equations employed in processing the observations. Further studies are required to justify the use of these equations. Figure 1, references 5: 1 Russian, 4 Western.
[17-6508]

UDC 551.465

BAROCLINIC INSTABILITY OF LARGE-SCALE CURRENT IN VICINITY OF POLYMODE EXPERIMENT

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 13 Mar 85) pp 563-567

FILYUSHKIN, Yu.B., Oceanology Institute imeni P.P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] A previous work showed that baroclinic instability of large-scale currents represents a possible mechanism of generation of synoptic eddies. This work uses a two-layer model to continue the study of this question. Four different ways of recording the primary current in the area covered by the Polymode experiment are used and the maximum disturbance increase computed by one of them is found to correspond with the actually observed synoptic eddies in January through May of 1978. In the description with the best fit, the direction of the primary current is 211 degrees, direction of propagation of the disturbance wave at its maximum is 238 degrees, characteristic horizontal scale is 46 km, growth increment is 100 days, period of disturbance wave is 105 days, phase shift is 65° and the ratio of amplitudes of disturbances in upper and lower layers is 1.1:1.0. Figures 2, tables 2; references 8: 6 Russian, 2 Western.
[17-6508]

UDC 551.465

EFFECTS OF TRIAD RESONANT INTERACTIONS OF ROSSBY WAVES IN OCEAN

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 27 Nov 84) pp 558-562

MIRABEL, A.P., Oceanology Institute imeni P.P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] A two-scale expansion method is applied to the dimensionless quasi-geostrophic equation for the conservation of a potential eddy in the Rossby wave triad model to describe the vertical structure of motion. It is assumed that small-amplitude wave disturbances act upon the initial wave, which has constant amplitude. Curves of maximum growth are found for the entire set of resonant Rossby wave triads. The interaction is studied with the first

baroclinic mode as the primary wave. If this wave is longer than the deformation radius, maximum growth is found in a resonant triad with one component having near meridional orientation. Characteristic energy exchange times are computed. Figures 4; references 7: 2 Russian, 5 Western.
[17-6508]

UDC 551.465.62

FREE EVOLUTION OF BAROTROPIC GEOSTROPHIC TURBULENCE

Moscow OKEANOLOGIYA in Russian Vol 25, No 4, Jul-Aug 85 (manuscript received 30 Nov 83) pp 549-557

LARICHEV, V.D., Oceanology Institute imeni P.P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] A number of problems related to geostrophic turbulence remain unsolved, including the nature of the final stage of free evolution of geostrophic turbulence and the relationship between the theory of turbulence on the β plane and the theory of two-dimensional solitary Rossby waves. This article studies the free evolution of geostrophic turbulence in a barotropic ocean. The influence of deformation radius and Rossby waves on two-dimensional turbulence is analyzed. A general description is presented of the evolution of two-dimensional geostrophic turbulence. The direct effect of β, based on a diffusion interpretation of the enstrophy integral, prevents small-scale mixing after the enstrophy spectrum reaches a certain value, resulting in greater regularity of motion over a broader space and time scale. References 14: 9 Russian, 5 Western.
[17-6508]

UDC 551.465.41:551.558.1

EXAMPLE OF NUMERICAL AND LABORATORY MODELING OF CONVECTION DEVELOPMENT

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian Vol 21, No 8, Aug 85 (manuscript received 27 Dec 83, after revision 8 May 84) pp 892-895

BUNE, A.V., DIKAREV, S.N., ZATSEPIN, A.G. and TISHAYEV, D.V., Oceanology Institute, USSR Academy of Sciences

[Abstract] A study is made of an example of numerical and laboratory reproduction of the process of development of convection in a two-layer unsteady stratified fluid in a two-dimensional area. The example is selected due to the comparative simplicity of laboratory experiments, as well as the limited capability of numerical computation at the present time. A description is presented first of the method for performing the laboratory experiments and

the mathematical model; then the results of numerical computation are compared with physical processes observed in the field. The laboratory experiments were performed in a sealed tank 2.2 cm deep, yielding quasi-two-dimensionality. The tank was initially filled with a two-layered NaCl solution which was allowed to diffuse. The results of the numerical calculations adequately reproduced the natural features of the observed phenomenon. Figures 2; references 3: 2 Russian, 1 Western.
[10-6508]

UDC 551.465.3

NUMERICAL MODELING OF EVOLUTION OF ANNULAR CONSTANT VORTICITY AREAS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian Vol 21, No 8, Aug 85 (manuscript received 28 Nov 83, after revision 16 Mar 84) pp 879-882

KOZLOV, V.F. and MAKAROV, V.G., Pacific Ocean Oceanology Institute, USSR Academy of Sciences

[Abstract] Results are presented from studies of the loss of stability of an annular constant-vorticity area by the contour dynamics method. A constant-vorticity area of this type is the simplest type of doubly connected steady configuration. The numerical algorithm used was described in previous works. Experimental results are interpreted by analytic analysis of stability in a linear approximation. The results obtained in this work can be used to estimate the stability of annular flows with transverse velocity shear in geophysical systems, as well as to interpret laboratory experiments. Figure 1, tables 1; references 13: 5 Russian, 8 Western.
[10-6508]

UDC 551.2439265.72)

STRUCTURE AND CONTEMPORARY ACTIVITY OF JUNCTION ZONE BETWEEN SUNDA SHELF AND SOUTHERN CHINA SEA TRENCH

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 3, May-Jun 85 (manuscript received 27 Feb 84) pp 102-106

KULINICH, R.G. and OBZHIROV, A.I., Pacific Ocean Oceanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] In 1981-1983, the authors' institute undertook geological-geophysical and hydrogeochemical work in the South China Sea, primarily in the southwestern portion of the basin where the Sunda shelf joins the deep-water trench. Gravimetric, magnetometric, sonar and bottom sampling studies were performed. The content of gases in sediments and in the water was

determined. The same methods were also used at the same time to produce a regional profile across the entire South China Sea, intersecting the major morphostructural elements of the basin and allowing determination of the general geological position of the region of the major studies southwest of the Sunda Basin. The peripheral rise surrounding the shelf structures on the east is found to be a tectonic-magmatic seam separating the relatively stable Sunda plate from an area of active dislocation. Contemporary volcanic activity is observed in the seam; hydrogen, methane and carbon dioxide gas anomalies are observed. These factors indicate contemporary peripheral seam activity related to continuing geological evolution of the South China Sea trench. This structure is assumed to be a fragment of the transregional meridional lineament. This lineament has manifested itself differently in different geological situations. In the south it passes through the western edge of Kalimantan Island and signs of its existence can be traced far beyond the limits of the region covered. Figures 3; references 11: 5 Russian, 6 Western.
[12-6508]

UDC 551.21

GEOLOGICAL STRUCTURE OF MAGELLAN MOUNTAINS IN PACIFIC

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 3, May-Jun 85 (manuscript received 26 Jan 84) pp 97-101

VASILYEV, B.I., YEVLANOV, Yu.B. and SIMANENKO, V.P., Pacific Ocean Oceanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] New data are represented on the geological structure of individual submarine sea mounts in the mountains of Magellan, obtained by dredging from the research vessel "Aleksandr Nesmeyanov" in 1983. Development of volcanic rock of primarily basic composition is observed, belonging to the alkaline-basalt series of oceanic islands and elevations such as Hess, Shatskiy and Marcus-Necker. Volcanic processes have significantly influenced synchronous sediment accumulation. Ferromanganese nodules were brought up from the subterranean slopes of the Magellan Mountains at several stations. They are apparently common on gently sloping sectors in combination with Quaternary silts in depth intervals from 1400 to 4300 m. The volume of nodules in dredges varied from a few dozens to 3-5 kg per dredge. At two stations fragments of other rock were not observed. Figures 3, tables 1; references 5: 4 Russian, 1 Western.
[12-6508]

UDC 553.435'444:551.214

SULFIDE ORES AND THEIR RELATIONSHIP TO SUBMARINE VOLCANOES AND ISLAND ARC HYDROTHERMS

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 4, Jul-Aug 85 (manuscript received 16 Jan 85) pp 26-39

AVDEYKO, G.P. and KRASNOV, S.G., Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] The search for pyrite ores in contemporary island arcs requires an analysis of their location and conditions of formation, which in turn requires joint analysis of materials on paleovolcanic province ores and contemporary continental and submarine hydrothermal ore-forming systems. The Devonian pyrites of the southern Urals and Altay area are compared with manifestations of contemporary hydrothermal activity. Submarine hydrotherms with sulfide ore formation are associated with calderas, volcanic craters and domes. Conditions of submarine hydrothermal sulfide ore formation along the mid-ocean ridges and island arcs are compared. Such ores can be formed at depths of over 400 m. Figures 3, tables 1; references 59: 29 Russian, 30 Western.
[16-6508]

UDC 550.311

CONVECTION BENEATH CONTINENTS AND OCEANS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 7, Jul 85 (manuscript received 28 Nov 84) pp 3-13

TRUBITSYN, V.P. and FRADKOV, A.S., Earth Physics Institute imeni O.Yu. Shmidt, USSR Academy of Sciences

[Abstract] It is demonstrated that the mismatch in temperatures computed for a depth of 700 km depending on whether the upper boundary of the layer in which convection occurs is assumed to be the base of the lithosphere or the earth's surface can be eliminated by considering the basic difference in the roles played by continental and oceanic lithospheres in mantle convection. Numerical calculation of models of thermal convection in the oceanic upper mantle is performed for various rates of movement of the lithosphere. Thermal convection in the continental upper mantle is excited by a small temperature difference with a Rayleigh number several times less than in the oceanic mantle. Considering that the oceanic lithosphere takes part in thermal convection, the temperature at the earth's surface should be taken as the condition at the upper boundary of the viscous layer of the mantle in this area. The heat-conductive oceanic lithosphere increases the effective thickness of the upper thermal boundary layer and decreases the Nusselt number. A change in the rate of movement of the oceanic lithosphere may lead to global restructuring of convective currents in the upper mantle. Figures 5, tables 1; references 16: 5 Russian, 11 Western.
[15-6508]

UDC 550.834:551.214(265.72)-82

BASIC FEATURES OF STRUCTURE AND MORPHOLOGY OF VOLCANIC ZONE AND INDIVIDUAL SUBMARINE VOLCANOES IN THE VICINITY OF KATUIK AND FU-KUY ISLANDS ON VIETNAM SHELF BASED ON CONTINUOUS SEISMIC PROFILING DATA

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 5, Sep-Oct 85 (manuscript received 18 Oct 83) pp 34-43

BONDARENKO, V.I. and NADEZHNYY, A.M., Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] A study is made of the results of continuous seismic profiling by the central beam method in an area measuring 90 X 90 km with 5 to 15 km between runs with detailed studies at intervals of 0.2-0.5 km in some areas. The area is of interest because of manifestations of volcanism on the shelf near Katuik Island, where an eruption occurred in 1923. The purpose of the studies was to determine the structural position of areas of contemporary submarine volcanism, the geological structure of the region and the structure of individual volcanoes. Specifics of Cenozoic volcanism in the territory of Vietnam are discussed. The volcanic zone near the two islands in a fragment of an area of Quarternary basaltic volcanism surrounding the Mekong depression, which in turn is a part of the Cenozoic volcanic province of Southeast Asia. Volcanism has covered the area in recent times, some twenty active volcanic structures, both contemporary and buried, having been found. Volumes of erupted material are estimated for the two slag cones studied in detail as 40 and 60 million m^3. Tectonic movement related to the formation of the South China Sea and Mekong depressions and glacioeustatic fluctuations in sea level have significantly influenced the formation of the sedimentary cover in this region. Figures 4; references 11: 6 Russian, 5 Western.
[64-6508]

UDC 525.6

INDIRECT EFFECT OF MARINE TIDES ON GRAVIMETRIC EARTH TIDES KAPG STATIONS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 6, Jun 85 (manuscript received 30 May 84) pp 14-19

VENEDIKOV, A., IVANOVA, M.V. and PERTSEV, B.P., Earth Physics Institute imeni O.Yu. Shmidt, USSR Academy of Sciences; Geophysics Institute, Bulgarian Academy of Sciences

[Abstract] The influence of the tides on variations in the force of gravity are calculated for seven Eastern European tidal gravimetric stations by summation of the influence of individual areas into which the terrestrial sphere has been divided. All three components of the indirect effect are considered. The results of the computations of the influence of the tides on tidal variations in the force of gravity are presented in tabular form. Tables 5; references 12: 5 Russian, 7 Western.
[14-6508]

UDC 681.7.621.384

ALLOWANCE FOR NONISOCHRONICITY OF PHOTOCHRONOGRAPH INPUT OPTICAL SYSTEM IN REGISTRY OF SUBPICOSECOND LASER PULSES

Moscow IZMERITELNAYA TEKHNIKA in Russian No 5, May 85 pp 32-34

KOLESOV, G.V., KORZHENEVICH, I.M., LEBEDEV, V.V. and STEPANOV, B.M.

[Abstract] When registering subpicosecond laser pulses with a photochronograph it is important to take into account their distortions by the input optical system. The drawing-out of light pulses by aberrations and by dispersion of the refractive index of glass have been dealt with by other authors. This article examines effects associated with the nonisochronicity of the input optical system (nonisochronicity in image construction on the photocathode): drawing-out of the laser pulse and its distortion during operation of the photochronograph and image curvature by the time slit on the screen. This nonisochronicity arises due to curvature of the laser beam wave front at the photocathode. The problem is examined for a laser with a stable resonator whose radiation is limited by a caustic surface. It is assumed that the laser generates a fundamental transverse mode whose intensity on the caustic is e times less than on the optical axis. Computations were made in a paraxial approximation. The following aspects of the problem are considered: caustic surfaces and ray approximation; nonisochronicity of image construction on photocathode; distortions caused by nonisochronicity of in-out optical system; admissible inaccuracy in beam focusing by one lens; nonisochronicity of input optical system of "Agat" photochronograph in linear scanning regime: regulation of photocathode illumination; compensation of nonisochronicity of image converter by input optical system; input optical system with small nonisochronicity. Procedures are given for minimizing the nonisochronicity and compensating for the nonisochronicity of the image converter. Figures 2; references 9: 8 Russian, 1 Western.
[384-5303]

UDC 534.37

AVERAGED LAW OF SOUND DIMUNITION IN IRREGULAR NEAR-BOTTOM SOUND CHANNEL

Moscow AKUSTICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 pp 537-538

KATSNELSON, V.G., KULAPIN, L.G., KRAVTSOV, Yu.A., PETNIKOV, V.G. and SABIROV, O.P., General Physics Institute, USSR Academy of Sciences

[Abstract] The articles gives a comparison of the results of computations made using averaged expressions derived earlier (V.G. Katsnelson, et al., AKUST. ZHURN., Vol 30, No 5, pp 507-517, 1984) and on the basis of summation of adiabatic modes (adiabatic theory (V. G. Katsnelson, et al., TRUDY FIAN, Vol 156, pp 98-110, 1984)) with published results of measurements of sound intensity in a shallow sea. The computations and experiments were carried out for tonal acoustic signals with the carrier frequencies 100 and 300 Hz propagating in a shallow sea (acoustic waveguide) with a variable depth and with a negative speed-of-sound profile. Such a waveguide for the most part is characterized by near-bottom sound propagation. The bottom is represented by a homogeneous fluid half-space with a density ρ_{bot}, the speed of sound c_{bot} and a complex refractive index whose imaginary part, determining losses in the bottom, is dependent on frequency. The main contribution to the field is from bottom waves (rays not touching the sea surface). The coefficients of attenuation of the lower modes, which correspond to bottom rays, are relatively small and comparable to one another, whereas for modes corresponding to bottom-surface rays the losses increase sharply with an increase in the angle of glancing against the bottom. In this formation of the problem, an expression was derived for computing the averaged intensity of sound. In computing intensity by this formula in a real waveguide the measured speed-of-sound profiles were interpolated. The results of computations by this formula and the results of computations based on the summation of adiabatic modes are compared graphically. This comparison shows that the results of computations based on summation of adiabatic modes agree fairly well with experimental data at both frequencies used. In the case of a frequency of 100 Hz there is good agreement with the adiabatic theory and experimental data along the entire path, whereas at a frequency of 300 Hz there is satisfactory agreement to a distance of 100 km, after which the results somewhat diverge. This discrepancy might be lessened by the introduction of bottom-surface rays into the scheme for computing averaged intensity. Figures 1; references 5: 3 Russian, 2 Western. [445-5303]

UDC 534.231.1

THEORY OF ACOUSTIC NOISE IN DEEP STRATIFIED OCEAN

Moscow AKUSTICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 2 Aug 84) pp 524-527

GULIN, O.E., Pacific Ocean Oceanological Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] The propagation of acoustic waves in the ocean is influenced to a considerable degree by speed-of-sound stratification. However, any stratification $c(z)$ different from uniform cannot be examined analytically, instead requiring numerical integration of the expressions given in this article. The problem is therefore investigated by numerical analysis methods after clarifying the principal laws of transformation of the acoustic field and its characteristics in a nonuniform stratified medium. This can be done in three cases, each of which is examined in detail: in the case of constancy of the parameters entering into the fundamental equation (uniform medium), an exponential change in density $\rho(z)$ and a constancy of all other parameters, a piecewise-continuous density profile and especially a profile of the type $\rho(z) = \{p_0, z \geqslant h, \rho_1, z < h\}$. The exponential density profile corresponds to a model of an isothermic atmosphere since the equations describing the initial boundary-value problem are also correct for acoustic waves in the

atmosphere. The model of a medium with a density jump corresponds to conditions in the ocean. The in-depth analysis of these cases makes it possible to define the general laws of propagation of acoustic waves from noise sources in a stratified medium and to determine the characteristic parameters of the problem. This can serve as a basis for carrying out numerical modeling. References: 5 Russian.
[455-5303]

UDC 534.28

ATTENUATION OF MEAN FIELD DURING WAVEGUIDE SOUND PROPAGATION IN OCEAN WITH WAVE-COVERED SURFACE

Moscow AKUSTICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 29 Apr 84) pp 511-512

ABROSIMOV, D.I., DOLIN, L.S. and PECHAYEV, A.G., Applied Physics Institute, USSR Academy of Sciences

[Abstract] Sound scattering on the sea surface can result in an appreciable attenuation of an acoustic signal propagating in an underwater acoustic channel (UAC). In order to evaluate the coherent component of the signal with losses of this type it is possible to adapt known modal programs for the computation of acoustic fields in regular UAC if appropriate imaginary corrections are introduced to the wave numbers of the modes--coefficients of attenuation of the coherent components of normal waves. This article gives derivation of formulas which can be used in obtaining these coefficients. The procedure is illustrated in the case of an UAC with an uneven upper boundary. A rectangular area Σ with the dimensions Δx and Δy considerably exceeding the wavelength of sound λ and the roughness correlation radius ℓ, but small in comparison with the scale of attenuation of the mean field, is discriminated at this upper boundary. The roughness is assumed to be gently sloping and small in comparison with the wavelength of sound. In this formulation of the problem an expression is derived for the field component singly scattered in the sector Σ. Due to sound scattering in the uneven sector Σ there is a loss in intensity of the coherent field of the mode. Assuming the process of attenuation of intensity of the coherent field of an individual mode to be exponential, it is possible to find the value of the attenuation coefficient of the coherent component of a normal wave (formula (2)). This formula is then analyzed for a case when waves are described by the Pierson-Moskovitz spectrum. The conclusions drawn in the article agree with earlier known theoretical and experimental results (such as M. T. Sheehy, et al., "Measurement of the Attenuation of Low-Frequency Underwater Sound," JASA, Vol 29, No 4, pp 464-469, 1957). Figures 1; references 5: 3 Russian, 2 Western.
[445-5303]

UDC 534.28

SPATIAL COHERENCE AND DISTRIBUTION OF FIELD INTENSITY IN UNDERWATER ACOUSTIC CHANNEL

Moscow AKUSTICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 27 Feb 84) pp 417-422

ABDULLAYEV, S.S. and PIYAZOV, B.A., Tashkent State University imeni V.I. Lenin

[Abstract] The spatial-temporal coherence and intensity distribution of the low-frequency acoustic field in the ocean are important aspects of oceanic acoustics. However, theoretical computations of these characteristics in the real ocean is complicated when many factors are taken into account: vertical and horizontal inhomogeneities in the ocean, waves on its surface, turbulence, etc. Until now it has been impossible to derive precise closed expressions for the correlation function and the distribution of the mean intensity of the acoustic field even in the case of a horizontally homogeneous ocean with an arbitrary vertical speed-of-sound profile. Such closed expressions would be of great practical importance because the vertical speed-of-sound is dependent not only on place, but also season of the year. Existing methods for computing these acoustic field characteristics are based either on the geometrical acoustics approximation or on numerical analysis. In contrast, this article describes an asymptotic method for computing the spatial correlation function of the acoustic field in an ocean with an arbitrary smoothly changing speed-of-sound profile. The authors examine the specific problem of computation of the spatial correlation function and vertical distribution of mean sound intensity in a horizontally homogeneous ocean at a quite great distance from an extended spatially incoherent source. Expressions are derived which describe the oscillatory nature of the vertical distribution of intensity. References 11: 9 Russian, 2 Western.
[445-5303]

UDC 534.23

EVALUATIONS OF APPLICABILITY OF WKB APPROXIMATION IN NORMAL WAVES METHOD

Moscow AKUSTICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 14 Dec 83) pp 496-501

PLOTKIN, A.M., Acoustics Institute imeni N. N. Andreyev, USSR Academy of Sciences

[Abstract] The WKB (Wentzel-Kramers-Brillouin) approximation is the basis for a large number of asymptotic methods for computing the acoustic field in the ocean. This approximation gives an inexact value of the acoustic field in the neighborhood of ray turning points. If the turning point lies in an interval of rapid change in the refractive index great errors will arise on the entire further path of the ray; this also applies to the depth

derivative of the index. The magnitude of this error will be different, depending on the method for interpolating the speed of sound. In the standard interpolation method in each layer the gradient of the square of the refractive index is constant. Then the solution of the transverse equation in the layer is given by Airy functions and the use of the WKB approximation is reduced to use of asymptotic representations of Airy functions. In this article the magnitude of the error in application of the WKB approximation in computation of the acoustic field in a stratified ocean is related to the inaccuracy in the asymptotic representation of the Airy functions. This provides a convenient method for evaluating this error. Since there is an analogy between the acoustic field computed in the WKB approximation by the normal waves method and the ray method, the normal waves method is used but the terminology of the ray method is employed. Estimates of the error in computing the wave number and the amplitude of normal waves are made. More precise estimates can be obtained for each individual distance (this requires finding the error for normal waves forming the acoustic field at this particular distance). Evaluations of the accuracy of the modified WKB approximation are given. Figures 2; references: 6 Russian.
[445-5303]

UDC 621.373.826

DISPERSION SPREADING OF FEMTOSECOND LIGHT PULSES IN CRYSTALS, AIR AND WATER

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 12, No 6, Jun 85 (manuscript received 15 Jun 84) pp 1191-1195

BIRMONTAS, A., VASILYAUSKAS, V., PISKARSKAS, A. and STABINIS, A., Vilnyus State University imeni V. Kapsukas

[Abstract] Considerable progress has been made in the generation of femtosecond light pulses. There are now lasers generating light pulses with a duration less than 100 fs. A decrease in the duration of femtosecond pulses is achieved by linear frequency modulation of the carrier frequency of such a pulse in a light guide. It is important to develop femtosecond nonlinear-optical devices which take into account dispersion spreading of pulses of such short duration. Only fragmentary data have been published on the lengths of dispersion spreading in some media. Considering this gap in knowledge, the authors used a computer in a numerical study of the dispersion spreading of light pulses in a number of nonlinear crystals: KDP, ADP, $LiNbO_3$, $LiIO_3$, Ag_3AsS_3, as well as in air and water. For example, it was possible to determine the dependence of dispersion spreading length L_{ds} in different crystals on wavelength in the case of ordinary polarization of pulses with a duration of 100 fs. Since the length of a crystal usually does not exceed several contimeters, in a case $L_{ds} > 10$ cm it is postulated that the dispersion spreading of pulses in general is insignificant. In all the considered crystals there is a wavelength region for which the spreading of pulses with a duration of 100 fs can be neglected. For pulses with a duration of 10 fs such a region will be substantially less. The dependence of the dispersion length of pulse spreading on wavelength is extremely sharp. The absence of light pulse

spreading in the second approximation of dispersion theory does not mean that the pulse will not spread at all; therefore, the third approximation of dispersion theory must be used. The dispersion spreading lengths obtained for different crystals are correct in an examination of pulses without initial phase modulation in dispersion media. In the propagation of Gaussian pulses with linear frequency modulation their duration changes with distance. Phase modulation of light pulses can be an important factor in shortening the dispersion spreading length of femtosecond pulses in the medium. The spreading of even picosecond light pulses can be important in the nonlinear crystals considered. Corresponding data are given for air and water. Figures 3, tables 1; references 16: 8 Russian, 8 Western.
[423-5303]

AWARD NOMINATION FOR WORK ON GEOLOGY OF ATLANTIC FLOOR ENDORSED

Moscow PRAVDA, 2 Oct 85 p 3

[Article by L. Brekhovskikh, academician, member of the USSR Academy of Sciences]

[Abstract] The authors write briefly in support of the USSR State Prize nomination for the cycle of works entitled "Geological-Geographical Studies of the Floor of the Atlantic Ocean." They note that this work represents 25 years of studies by A. Lisitsyn, Ye. Yemelyanov and A. Ilin, the results of which have been summarized in five monographs, and they characterize the major findings of the research.

FTD/SNAP
/9716
CSO: 1865/53

INSTRUMENTS THAT CAN 'SEE THROUGH THE EARTH'

Moscow MOSCOW NEWS in English No 26, 85 p 10

[Text] Experiments in electromagnetic sounding of vast territories at depths of dozens of kilometers have been carried out by scientists in the Soviet Union. Their instrument uses electromagnetic fields set up by powerful magnetohydrodynamic pulse generators.

Vice-President of the USSR Academy of Sciences Academician Yevgeny Velikhov and Mikhail Zhdanov, D.Sc. (Physics and Mathematics), comment on the prospects of the research.

Experiments involving the electromagnetic sounding of the earth's crust were first held in the USSR and other countries in the 1950s. But until recently geophysicists mainly relied on natural variations in the earth's magnetic field in their research. These variations are set up by the interaction of streams of ionized gas particles from the sun (solar wind) with the earth's magnetosphere and ionosphere at altitudes of 100-200 kilometers. This interaction produces eddy currents which set up secondary (induction) currents in the earth and, consequently, electromagnetic fields. It is the latter that carry information on the earth's internal composition.

The above method, however, involves great difficulties. The thing is that the intensity and shape of magnetosphere and ionosphere sources (sources of eddy currents) are, as a rule, not certain. Besides, their shape continuously varies with time. This is why researchers have been increasingly turning to methods of in-depth electromagnetic sounding using artificial sources whose currents and forms of the currents can be controlled. The only difficulty was that no sources of adequate power existed.

Solid-Fuel Engine Harnessed By Geophysicists

The Kurchatov Atomic Energy Institute suggested the use of magnetohydrodynamic (MHD) generators capable of producing short bursts of colossal energy of 80-100 thousand kilowatts and a current of 20,000 amperes.

An MHD pulse generator is a solid-fuel rocket engine that changes the energy of the burning fuel into electricity. The solid fuel used for the purpose contains additives of easily ionized substances. The resulting jet of electroconductive plasma heated to nearly 3000° C rushes at a tremendous speed through a rectangular nozzle of what is called the MHD canal. Its upper and lower walls are made of insulating materials that stand up to intense heat, while its lateral walls are lined with refractory metal and serve as electrodes to draw off the current. Coils of wire (solenoids) are attached to the upper and the lower portions of the MHD canal, which are fed with a strong current as soon as the fuel starts burning. They set up a magnetic field across the canal and it acts as a sharp brake on the jet of plasma. As a result, a strong pulse of current appears between the electrodes.

This pulse is fed either to two electrodes imbedded in the ground hundreds of meters or several kilometers apart or is sent through a big wire loop (several kilometers in diameter) laid out on the ground. In the former instance the source of the primary field is called an electrical dipole, in the second the source is an induction loop. Currents in the dipole or in the loop sharply vary in time, and the pulse has an almost rectangular shape and its duration can be 5 to 15 seconds.

The primary alternating electromagnetic field set up by the current passing through the loop or in a dipole gives rise to electric currents in the conducting layers of the Earth and these currents set up a secondary (induced) magnetic field. Special pickups installed on the surface record the effect produced by these two fields. Currents induced in the earth and, correspondingly, secondary fields, vary with the conductivity of the area under investigation. Electrical conductivity of the earth's depths can provide clues to so-called thermodynamic and phase states of rocks at great depths, as well as on zones likely to contain minerals (deposits of ores are good conductors, while oil and gas are poor conductors).

The Khibiny MHD

Among the several types of MHD generators designed in the USSR, the Khibiny-9 is used to sound the mainland and the shelf areas of the Barents Sea to a depth of dozens of kilometers. The MHD generator is installed on the narrow isthmus between Kola Peninsula and Rybachy Peninsula. Current from the MHD generator passes through two massive aluminum wires to metal groundings located in the two bays on both sides of the isthmus. The current spills over into the sea in a series of loops of 50 to 100 kilometers in radius. The loops form primary sources of electromagnetic fields that sound the depths of the earth. The strength of the current at the electrodes of the MHD generator, as has been mentioned, is nearly 20,000 amperes, hundreds of times greater than in conventional geophysical installations based on internal combustion engine generators.

Thanks to such powerful installations, it has become possible to significantly increase the depth of sounding, and to survey vast areas using a single installation. In particular, the pattern of conductivity of the earth's crust over a vast area in Kola Peninsula has been found by MHD sounding. It should be noted that the results have been unexpected. It was believed in the past, for instance, that the local crystalline shield was a comparatively homogeneous structure composed of rock that does not conduct electricity well. There have been found some ten big blocks of varying electric resistance. Experiments have revealed paths capable of conducting electric currents and linked with ore-bearing objects, and zones which may contain minerals.

Subterranean Holograms

Thus the use of MHD generators in geophysics affords a better insight into the maze of electric conductivity of rock at great depths.

But can the MHD method, besides detecting deposits of minerals, also produce their three-dimensional images? It just so happens that it can. A method designed in the USSR so far uses a technique based on the idea of optical holography. The difference consists in that the pickups installed on the surface in MHD sounding register the amplitude and the phase of the electromagnetic fields set up by an MHD generator instead of light waves. Instead of using laser light, as in holography, the procedure uses supplementary sources of electric current located on the ground where the pickups are. The shape of signals in them is determined by the pattern of the recorded field. The electromagnetic field set up by these supplementary sources is called a migration field. It is this field that produces a three-dimensional image of the earth's internal composition.

/9716
CSO: 1865/42

COMPUTING CENTER WARNS OF TSUNAMIS

Moscow TASS in Russian 1110 GMT 16 Nov 85

[Text] Krasnoyarsk. A gigantic wave, a tsunami, induced by an earthquake in the region of the Aleutian Islands, will be able to reach the Columbian town of Bahia de Solano, having covered more than ten thousand kilometers, in 15 hours. This is the conclusion reached by scientists of the computing center, situated in this town of Eastern Siberia.

"In accordance with a contract concluded with UNESCO, Soviet specialists have to work out detailed maps for the passage of tsunamis for 23 inhabited points of eight countries situated along the coast of the Pacific Ocean," said the director of the center, corresponding member of the USSR Academy of Sciences Yuriy Shokin. "We have already conducted such investigations for various sections of the coast of the Kurile Islands and of Sakhalin. Today, our recommendations are used here for selecting sites for the construction of new domestic and industrial buildings and installations. Recently for example, the Tsunami Service warned the population of Sakhalin days in advance of the approach of a tsunami caused by an earthquake along the shores of Chile.

Now Siberian scientists "play out" on computers various models of tsunamis, which may arrive from any seismically dangerous zones of the Pacific Ocean to the countries of Southeast Asia. At the end of next year, the specialists of all interested states will receive detailed warning maps.

/9716
CSO: 1865/80

LASER RANGE FINDERS, THEODOLITES AID DETECTION OF CRUSTAL MOVEMENT

Moscow TASS in English 11 Nov 85

[Text] Vladivostok. Soviet scientists have detected the movement of the earth's crust running into dozens of millimeters a year with the help of laser range finders and theodolites. The experiments were conducted on the tectonically active islands of the Far Eastern Basin.

A TASS correspondent has been told at the Institute of Marine Geology and Geophysics of the Far Eastern Center of the USSR Academy of Sciences that as a result of measurements and calculations made in the course of several years some other interesting phenomena had been revealed. The earth's crust moves even within the limits of a testing ground in various directions and with varying speed. Sometimes the shifts stop and change directions.

Concrete monuments with metal bench marks have been built on top of the cone-shaped hills. A laser beam sent by the range finder reaches the target in thousandth fractions of a second and after that is again received by the instrument. The high accuracy of measurement has been confirmed. The obtained data are processed by computers.

Along with horizontal measurements vertical measurements are carried out: changes in the elevation of separate hills above sea level are checked. With the help of astronomical observations of the stars scientists detect possible minor displacements of terrain relative to the earth's axis and the equator.

The Far Eastern Institute of Marine Geology and Geophysics has at its disposal a major "testing ground" that stretches from the Arctic Ocean to the Indian Ocean. In the opinion of the scientists, the most important problem is the forecasting of earthquakes which cause a lot of trouble to residents of that region. Certain signs showing the approach of an earthquake have been detected by scientists, including changes in the water level in experimental wells, gas ejections etc. Scientists believe that the study of movements of the earth's crust will help to reveal other possible forerunners of earthquakes.

/9716
CSO: 1865/80

POST-GLACIAL UNIVERSAL ELEVATION SLOWS

Moscow TASS in English 28 Aug 85 1359

[Text] The present generation lives in the age of unloading of the earth's crust, Soviet geographers believe. This means that the earth's crust is rising in a vast territory formerly covered by glaciers. The territory of Finland and the Baltic republics, for instance, is rising by 10 mm a year. Karelia and the Kola Peninsula are also rising, although at a smaller rate.

A TASS correspondent was told at the Institute of Geography of the USSR Academy of Sciences that the latest observations in the Antarctic have convinced scientists that the earth's crust is moving upwards in the southern hemisphere as well.

But this process of universal rising is petering out. While in the past, when the glaciers were intensively melting, the earth was rising rather fast. At present the average annual rate of movement world-wide does not exceed several millimeters.

Leningrad, for instance, has already reached the zero point. Scientists believe that next the city and its suburbs, like many other areas all over the world, will begin gradually to sink.

Glaciers covered the northern hemisphere at least four times during a short geological period of three million years. In every ice age, the earth's crust sank under the load of ice caps and, when the glaciers had melted, lifted up anew.

/9716
CSO: 1865/26

SOVIET UNION WILL DRILL 22 SUPERDEEP HOLES

Moscow TASS in English 29 Aug 85 2344

[Text] Vladimir Mazur, Deputy Minister of Geology of the Russian Federation, has told MOSCOW NEWS that 22 superdeep holes are going to be drilled in the republic. Twelve of them will be used for the basins' oil-bearing research and the rest will help in study of the mineral wealth of the regions and their tectonic framework. The 12,064 meter Kola hole, for example, has already provided information about the structure of the old baltic shield.

The exploration of the oil and gas resources in West Siberia has been so far conducted at no more than 5,000 m. But the geologists believe that rich oil and gas deposits are hidden at a deeper level. A new 8-10 kilometer urengoy hole will show whether the forecasts are right.

Geologists hope to open new reserves in the well-studied ore region in the Urals. The Ural superdeep well will be drilled near Nizhni Tagil.

Several holes will be drilled simultaneously in the Timano-Pecherskiy oil and gas province [European North of the USSR], specifically, near the working Vuktylskoye and the recently discovered Zapadno-Soplesskoye gas reserves, where, as in the Tyumen region, there are prospects for oil and gas research. The footage will be done with a Romanian drilling rig.

We have established close production ties with our Romanian colleagues in the field of prospecting and exploitation of oil and gas resources, Vladimir Mazur noted.

/9716
CSO: 1865/26

DISCOVERY IN THE FIELD OF EARTHQUAKE PREDICTION

Moscow ECOTASS in English No 22, 27 May 85

[Text] Igor Gubin, Corresponding Member of the USSR Academy of Sciences, has established during seismotectonic research that the size of an earthquake focus and its magnitude (energy) are determined by the size of the earth's crust blocks which shift along fissures. This discovery has made it possible to draw maps of seismic zones of a new type. The maps indicate zones of the origin of future earthquakes foci and give their detailed characteristics--the magnitude of possible earth jolts, frequency of their recurrence, the size and depth of quake foci--which have an effect on the shaking force on the earth's surface. The discovery has served as the basis of a new direction in seismology and has led to a qualitative basic restructuring of a seismic zoning procedure.

/9716
CSO: 1865/389

COMPUTER-AIDED EARTHQUAKE OBSERVATIONS IN FAR EAST

Moscow SOVETSKAYA ROSSIYA, 20 Oct 85 p 6

[Article by S. Saktaganov (Magadan)]

[Text] Observations of underground tremors and movements of the earth's crust in the extreme northeastern part of the country will now be conducted with the aid of the latest electronic technology. Compact computers have been installed at facilities of the seismology team of the Northeast General Scientific Research Institute of the USSR Academy of Sciences' Far East Research Center. They will help the seismologists locate epicenters of earthquakes and determine their intensity quickly. Preparations are being made to introduce a bank of seismological data gathered from all over the region.

FTD/SNAP
/9716
CSO: 1865/91

ECONOMIC WEEKLY VIEWS CEMA GEOLOGICAL COOPERATION

Moscow EKONOMICHESKAYA GAZETA in Russian No 41, Oct 85 p 20

[Text] Under the heading "CEMA: Integration in Action" by I.D. Vorona, head of the Geology Department of the CEMA Secretariat entitled "Geologists' Cooperation" about cooperation among the socialist bloc's geologists, writes: "The main efforts of the countries which engage in cooperation are focused on exploration and prospecting for the main minerals, including minerals which are in short supply. This cooperation is based on forecasts of the long-term development of the mineral and raw material base and on efforts to cover the CEMA countries' rational requirements as regards minerals.

"One of the key avenues of the work of the CEMA standing commission for cooperation in GEOLOGY is the study of the natural laws governing the formation and location of oil and gas deposits which includes totaling up and reassessing estimated reserves every 5 years. As a result, 11 oil and gas basins have been identified on the territories of the European CEMA countries including western parts of the USSR and the SFRY and a quantitative evaluation of estimated oil and gas reserves down to a depth of 4,000-5,000 meters and to a depth of 7,000 meters has been carried out. During the last 15 years proven oil and gas reserves in a number of these countries have increased which has made it possible to increase extraction or to maintain it at the previous level. For instance, around 200 hydrocarbon raw material deposits have been discovered and reserves of natural gas have increased markedly in Bulgaria, Hungary, the GDR, Poland, Czechoslovakia and western parts of the USSR."

Estimated reserves of coal in more than 500 basins and deposits have been totaled up including those located at great depths and in complex geological conditions. The most favorable sectors have been identified and earmarked for priority development.

In forecasting the structure of their fuel and energy balance for the foreseeable future, many CEMA countries envisage a greater role for coal. Alternative energy sources--bituminous shale and geothermal waters--are also being studied.

Prospecting for iron, manganese, chromium, copper, lead, bauxite, mercury, antimony, and magnesites has been carried out in the Carpathians and the Caucasus using fundamentally new space and aerial geological survey methods, modern computer equipment and regional forecasting techniques.

Scientific and technical cooperation accounts for more than 50 percent of the volume of the joint work carried out within the framework of the commission. More than 40 national scientific research and design and development organizations take part in this cooperation.

Much attention is being paid to geological prospecting work in fraternal socialist countries outside the continent of Europe.

An international geological expedition has been at work in Mongolia since 1975. As a result three fluorite deposits have been discovered, and ores including polymetals, tungsten, molybdenum, silver and gold have been detected; a geological map and a mineral deposit map have been compiled. Among the deposits evaluated and prospected by the expedition the Undur-Tsagan molybdenum and tungsten deposit, the Mungun-Undur silver and polymetal deposit and two fluorite deposits in the North Kerulen region are of considerable commercial interest.

Since 1979 an international expedition has been prospecting for nickel, copper, chromites, polymetals, phosphates, and asbestos in Cuba.

Under an agreement signed in 1980 joint prospecting work in the SRV has led to the discovery of promising areas as regards bauxites and shows of tungsten, molybdenum and rock crystal.

In the seventies multilateral scientific research cooperation was developed under programs such as the Intermorgeo, the Intergeotekhnika, Geoinform, and Interneftegaz.

Under an agreement between the GDR, Poland and the USSR the Petrobaltik organization is prospecting for oil and gas on the Baltic shelf. The first positive results have been obtained.

In the southern part of the Black Sea shelf the USSR and Bulgaria are jointly prospecting for ores and construction materials and continuing their work in the search for oil and gas.

In the coming 5-year period it is planned to "step up cooperation in geological studies of member countries' territories including the SRV, Cuba and Mongolia and to build up their mineral and raw material potential in the interests of meeting the needs of individual countries and the community as a whole," the article states in conclusion.

/9716
CSO: 1865/81

ALMA-ATA LASER DEVICE MEASURES CRUSTAL MOVEMENT

Moscow DOMESTIC SERVICE in Russian 0700 GMT 22 Aug 85

[Summary] Leningrad and Novosibirsk scientists have developed a laser device which reacts to the slightest tectonic movements of the earth's crust. The device has started operating at the Alma-Ata geophysical observatory in Medeo. To cut out external interference, scientists have immured the device in a drift hollowed out in a mountain; the temperature is constant there. The super-sensitive device reacts to oscillations in a broad range. Combined to form a single system, such devices make it possible to register any distortion of the earth's crust, assess the influence of lunar and solar induced tides on it and other factors.

/9716
CSO: 1865/26

UDC 551.7.031(084.2):551.35.06+551.244(265.51)

CHRONOSTRATIGRAPHY OF SEDIMENTARY BASINS ON NORTH BERING SHELF

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 3, May-Jun 85 (manuscript received 29 Oct 84) pp 34-43

ZABOLOTNIKOV, A.A., Tectonics and Geophysics Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Khabarovsk

[Abstract] A method has been developed to test the results of chronostratigraphic analysis, based on the empirically established functional relationship between lateral dimensions of subdivisions and absolute elevations of sea level at the maxima of transgressions during their accumulation. The seismofacial specifics of cross-sections in the sedimentary basins of the north Bering shelf are described and regional graphs of relative changes in sea level are presented. A linear and directly proportional variation is observed between lateral displacements of sectional subdivisions and absolute sea levels at the transgression maxima. No description of the procedures for chronostratigraphic analysis is given. Figures 3; references 14: 8 Russian, 6 Western.
[12-6508]

UDC 551.24

TECTONICS AND GEOLOGICAL NATURE OF THE ASIAN-PACIFIC OCEAN TRANSITION ZONE

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 3, May-Jun 85 (manuscript received 13 Dec 83) pp 3-15

SHILO, N.A. and TUYEZOV, I.K., Presidium, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok; Tectonics and Geophysics Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Khabarosk

[Abstract] The borders of the East Asian Seas consist of uncompensated Epimesozoic platforms laid down in the Eocene and Oligocene periods on a heterogeneous, primarily continental base. This article discusses the area extending from the outer edges of the deep-water trenches approximately to the coast line. This includes the structures of Koryak and Kamchatka plus

the deep-water trenches, island arcs and marginal seas. Geophysical data, deep-water drilling and dredging data indicate that the area consists of the flooded eastern margin of the continent with essentially continental crust, where neoplatform, island arc deep-water trenches were formed during various periods of the Cenozoic. The formations continue to develop at the present time. A significant portion of the transition zone was formed under dilatational conditions accompanied by heating of the deeper zones and activation of tectonic processes. Figures 6; references 48: 43 Russian, 5 Western.
[12-6508]

UDC 550.834

SEISMIC MODEL OF CRUST IN ASIAN-PACIFIC OCEAN TRANSITION ZONE OF KAMCHATKA

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 4, Jul-Aug 85 (manuscript received 26 Jul 84) pp 83-90

BALESTA, S.T. and GONTOVAYA, L.I., Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] Data from deep seismic soundings are used to construct a basic velocity model of the crust in the transition zone from the Pacific Ocean to the Asian continent near Petropavlovsk-Kamchatskiy. The crust and upper mantle in the transition zone feature a contrasting, stratal-block structure dominated by fault tectonics, with individual blocks clearly differing in structure and velocity characteristics. The crust in the area of contemporary volcanic activity has a number of peculiarities including a complex heterogeneous structure of the Cretaceous basement, relatively elevated (in the crust) and reduced (in the upper mantle) mean velocities, velocity inversions throughout the crust due to complex alternations of sedimentary-volcanic and intrusive rock, areas of hydrothermal change and the presence of various types of magmatic foci. The crust-mantle transition zone beneath volcanic regions shows reduced velocities in comparison with the nearby nonvolcanic regions. Figures 4; references: 15 Russian.
[16-6508]

UDC 551.21;550.361+550.36.004.14

THERMOGENIC STRUCTURES AND SEARCH CRITERIA FOR LATENT HYDROTHERMAL SYSTEMS NEAR PETROPAVLOVSK-KAMCHATSKIY

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 4, Jul-Aug 85 (manuscript received 5 Feb 85) pp 68-82

MASURENKOV, Yu.P., Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] Previous studies developing the concepts of volcanic centers as autonomous volcanic-plutonic-tectonic structures have clarified the role of hydrothermal processes in these centers. The regularities of localization and development of hydrothermal systems are at the same time criteria in the search for such centers. These criteria can be subdivided into structural, environmental and material. This article studies only structural criteria: the general geodynamic state of the region, dome structures, reaction of the medium to local increases in density of the endogenous flux of matter and energy, depressions in dome arches, rifts or grabens, deep fractures within volcanic centers and such volcanic apparatus as slag and lava cones, stratovolcanoes and extrusions. Structural analysis of the territory adjacent to Avachinskaya Bay reinforces the concept of a caldera nature of the bay. A complex concentric-zonal structure of dome-caldera type typical for a volcanic center was observed in the region for the first time. The continuing endogenous activity of the Avachinskaya volcanic center in the form of tectonic movement, seismicity and the presence of Holocene volcanic apparatus indicates the probable entry of the center into a stage of hydrothermal activity. Reserves of thermal water accumulated during the Quaternary in the Avachinskaya depression under favorable hydrogeological conditions can provide practically inexhaustible energy resources for the area. Radial and circular faults forming the structure of the Avachinskaya volcanic center could form an additional thermal water deposit. The most promising area for prospecting drilling for thermal water is near Yelizovo in the Pinachevsko-Aagskiy graben. Figures 6; references: 17 Russian.
[16-6508]

UDC 553.7.532.5:550.361(571.66)

THERMOHYDRODYNAMIC MODELS AND THEIR APPLICATION TO STUDY OF HYDROTHERMAL SYSTEMS

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 4, Jul-Aug 85 (manuscript received 26 Mar 85) pp 54-67

VORONKOV, V.A., KIRYUKHIN, A.V., SUGROBOV, V.M., Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] An analysis is presented of the ability of modeling to deepen knowledge concerning the formation of hydrothermal systems in volcanic areas

and of hydrothermal processes as a whole, using the Pauzhetskaya structure on Kamchatka as an example. The models studied cover the supply of heat and water to the northern portion of the deposit as well as the hydrodynamic and thermohydrodynamic processes. One- and two-layer models are used, yielding new information on the subterranean water resources arriving from surrounding rock deposits and deeper structures. The use of thermohydrodynamic models in this area shows their effectiveness for the collection of information on geothermal phenomena in areas of hydrothermal processes and the distribution of permeability within these areas, the natural flow of hydrothermal water and thermal water resources, as well as the most probable sources of supply of heat and water for hydrothermal processes. The reliability of predictions made by modeling is largely determined by the concepts used as the basis of the models. Thermohydrodynamic models, particularly numerical ones, are effective tools for the analysis of known concepts and sources for new concepts. Figures 6; references 18: 16 Russian, 2 Western.
[16-6508]

UDC 551.21:550.34

PRECURSORS OF VOLCANIC ERUPTIONS

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 4, Jul-Aug 85 (manuscript received 5 Feb 85) pp 108-119

TOKAREV, P.I., Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] A discussion is presented of the precursors of volcanic eruptions, an area previously little discussed in the literature. The article is limited to an analysis of the precursors related to the activity of central polygenic and secondary volcanoes on the surface. A classification of precursors is presented, and areas of manifestations and times of advance appearance of eruptions are discussed. Of all the precursors discussed, the most useful for short-term prediction are earthquakes, which yield the most complete information on processes occurring within a volcano before its eruption. Due to the great variety of volcano types and eruption types, precursors should be sought using geophysical, geochemical, geothermal and geological methods. Only such a combined approach can provide reliable prediction of eruptions. Figures 4, tables 3; references 16: 12 Russian, 4 Western.
[16-6508]

UDC 550.837.6

SPECIFICS OF ELECTROMAGNETIC FIELD OF MULTIPLE-SPACED ARRAYS OF FREQUENCY SOUNDING AND RESISTIVITY DETECTORS OVER HORST

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 7, Jul 85 (manuscript received 25 Jan 82) pp 51-59

KUZNETSOV, A.N., Naro-Fominsk Division, All-Union Scientific Research Institute of Geophysics

[Abstract] Methods of physical modeling are used to study the behavior of various components of the electromagnetic field of an electrical dipole over a two-dimensional model of a projection in a nonconducting base, using an electrolytic model. The width of the projection was variable, $L/h_1=3.57-10.7$. The remote sounding installations were located at $r/h_1=1.43-14.3$. Two-dimensional structures at the reference level can be located in the geoelectric cross-section and contoured by this method. Placement of the supply dipole over or near the heterogeneity is an obstacle to location of heterogeneities near the receiving dipole. Quantitative interpretation of the results produced is possible only for a system of observations from several places with different positions of the supply dipole. Figures 6; references: 3 Russian.

UDC 550.837.6

MAGNETOTELLURIC SOUNDINGS AT 10^{-3}-10^{4}S IN MURMANSK BLOCK OF KOLA PENINSULA AND CENTRAL KARELIA

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 6, Jun 85 (manuscript received 26 Apr 84) pp 48-56

VAGIN, S.A., VARDANYANTS, I.L., KOVTUN, A.A., KOKVINA, Ye.L., MOISEYEV, O.N., SAVELYEV, A.A. and USPENSKIY, N.I., Leningrad State University imeni A.A. Zhdanov

[Abstract] Soundings over the broad interval of periods mentioned in the title were performed in two regions--the central Murmansk block of the Kola peninsula between the Teriberka and Voronya rivers, where studies were previously performed, and central Karelia near Tiksha and Muyezero. A crustal conductive layer with a longitudinal conductivity of 20-50 Sm was observed at a depth of 10 km in the former area, 14 km in the latter. A second conductive boundary was found at a depth of 30-80 km in the former area, 16-150 km in the latter. Reduced resistivity in the upper Precambrian crust is not a rare phenomenon. The position of the conductive layer in the crust of the two regions on the Baltic shield coincides with the position of an intermediate layer, not seen on seismic velocity profiles, but distinguished practically throughout the area. The nature of the layer is not yet known. Figures 6, tables 1; references 18: 16 Russian, 2 Western.

[14-6508]

UDC 551.510.42:551.521.31

POSSIBILITY OF STUDYING FINE STRUCTURE OF SPECTRUM OF PARTICLE SIZES BY INVERSION OF OPTICAL CHARACTERISTICS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 8, Aug 85 (manuscript received 28 Oct 83, after revision
20 Feb 84) pp 885-888

BUSHUYEV, V.D. and NAATS, I.E., Atmospheric Optics Institute, Siberian Department, USSR Academy of Sciences

[Abstract] Optical methods for studying the microstructure of the atmospheric aerosol allow determination of the spectrum of particles in their natural state. If a set of particle-size distribution functions is obtained for the same location at different times it becomes possible to interpret the time variability of the microstructure by applying the aerosol kinetics equation, which relates the time variation in the particle-size spectrum to thermodynamic parameters of the atmosphere and therefore allows these parameters to be estimated based on optical atmospheric soundings. This article studies a few aspects of this problem related to the requirements which must be satisfied by optical methods and techniques of inversion of optical data. Methods of optical sounding of atmospheric aerosol are applicable to studies of transformation of the particle-size spectrum and, consequently, the inverse problem for the aerosol kinetics equation is quite regular. Figures 4; references 6: 5 Russian, 1 Western.
[10-6508]

UDC 551.521.3

NUMERICAL STUDY OF LIDAR SIGNAL FLUCTUATIONS CAUSED BY LARGE-SCALE ATMOSPHERIC AEROSOL HETEROGENEITIES

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 8, Aug 85 (manuscript received 6 Jan 83, after revision 30 Oct 84)
pp 841-848

GYNGAZOV, S.A., KAVKYANOV, S.I. and KREKOV, G.M., Atmospheric Optics Institute, Siberian Division, USSR Academy of Sciences

[Abstract] In most cases statistical information on the optical parameters of the atmosphere used in calculating the operating quality of optical radar (lidar) systems is rather general. Large-scale fluctuations in atmospheric parameters usually have significant variation coefficients, the fluctuations in optical parameters of the atmosphere in some cases reaching significant values. In such cases the use of the normal law to describe the fluctuations of positively defined parameters is impossible. This article gives the derivation of expressions for the mean value and correlation functions of an optical radar signal under such conditions, comparing the results obtained for weak and strong fluctuations. The distribution of fluctuations in a lidar signal is analyzed. A sample analysis demonstrates that the distribution of a lidar signal is most critical with respect to spatial distribution of the atmospheric aerosol, deviations of the distribution from the log normal occurring only for scales of spatial heterogeneities comparable with the length of the lidar path. Figures 4, references 9 Russian.
[10-6508]

UDC 551.524.4

SPATIAL AND TEMPORAL STRUCTURE OF TEMPERATURE FIELD IN ATMOSPHERIC SURFACE LAYER

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 8, Aug 85 (manuscript received 26 Dec 83) pp 816-823

AZIZYAN, G.V. and KOPROV, B.M., Atmospheric Physics Institute, USSR Academy of Sciences

[Abstract] A study is made of variation of asymmetry and excess as a function of height above the surface for a broader range of altitudes than in previous works, and variation of asymmetry with stratification parameters. The temporal structural functions of orders 2 to 6 are measured. The asymmetry, excess and other temporal difference characteristics are compared with similar characteristics of spatial differences. Anisotropy of the temperature field is found with nonequilibrium stratification for all distances up to the order of magnitude of the internal scale of turbulence. Figures 4, tables 2; references 8: 5 Russian, 3 Western.
[10-6508]

UDC 550.433+550.388

RESONANT PHENOMENA IN SEISMOIONOSPHERIC INTERACTIONS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 6, Jun 85 (manuscript received 31 Aug 83) pp 5-8

GOKHBERG, M.B., BULOSHNIKOV, A.M., GUFELD, I.L. and LIPEROVSKIY, V.A., Earth Physics Institute imeni O.Yu. Shmidt, USSR Academy of Sciences

[Abstract] A model of an equivalent oscillating circuit is used to study seismoionospheric oscillations excited by sources of current located within earth's crust during tectonic movements associated with earthquakes. Fractures of the crust are considered to form sources of current several tens of kilometers in length. These sources induce electrical discharges at the earth's surface. The appearance of secondary effects in the ionosphere may be related to excitation of natural oscillations of the local earth-ionosphere circuit as a result of large-scale seismic processes. Excitation of natural oscillations of this circuit is the only possible cause of notable heating and supplementary ionization of the ionosphere in such cases. Changes in the slope angle of magnetic lines of force to the horizon or in the plane of the magnetic meridian relative to the electric field line of the seismic source are not considered in the analysis presented here. Figure 1, references 6: 5 Russian, 1 Western.
[14-6508]

UDC 517.9:621.373.826

QUALITATIVE METHODS IN PHYSICS OF LASER HEATING OF METALS IN AIR

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA in Russian Vol 49, No 6, Jun 85 pp 1046-1053

BUNKIN, F.V., GALAKTIONOV, V.A., KIRICHENKO, N.A., KURDYUMOV, S.P. and SAMARSKIY, A.A., General Physics Institute, USSR Academy of Sciences; Applied Mathematics Institute imeni M.V. Keldysh, USSR Academy of Sciences

[Abstract] The combustion of metals under the influence of radiation, an important problem in laser thermochemistry, is examined. The solution of this problem required a detailed study of nonlinear boundary-value problems of a nontraditional type. The study made it possible to clarify the most important qualitative aspects of laser heating of metals in the air. A study was made of the heating of a metal sample occupying a half-space $z \geqslant 0$ by a beam of laser radiation with a stipulated intensity distribution, the parameters I_0 and r_0 determining the amplitude and effective width of the beam. A system of equations is written for the change in the temperature of matter. The properties of the temperature field in matter are dependent to a high degree on the presence or absence of stationary solutions of the system of equations (boundary-value problem). The principal properties of stationary states are

examined and the four principal results of study of stationary states are given (a review of earlier work by F. V. Bunkin and his colleages: KVANTOVAYA ELEKTRON., Vol 9, 1982; Vol 11, 1984; DAN SSSR, Vol 279, 1984). This is followed by an examination of conditions for the monotonic and nonmonotonic stability limits and the existence of a stability boundary. This analysis of the principal properties of the temperature field in the three-dimensional problem of the laser heating of a metal sample revealed that in all cases there is a stability boundary. It was found that the behavior of the boundary and bifurcation of stationary solutions is slightly dependent on the specific details of the radiation intensity distribution and the nonlinearity structure. Procedures are given for generalizing the results. When more realistic models are considered than that considered in the article, the fundamental equations must be supplemented and the initial boundary-value problem must be modified. It must be taken into account that processes at the sample surface have their specific characteristic times. It is demonstrated that there is a stability limit above which stationary states do not exist. Figures 4; references 14: 13 Russian, 1 Western.
[411-5303]

UDC 535.21:541.11:541.14

BIFURCATIONS, CATASTROPHES AND STRUCTURES IN LASER THERMOCHEMISTRY

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA in Russian Vol 49, No 6, Jun 85
pp 1054-1068

BUNKIN, F.V., KIRICHENKO, N.A. and LUKYANCHUK, B.S., General Physics Institute, USSR Academy of Sciences

[Abstract] The history of development of laser thermochemistry is reviewed. During 1984 more than a hundred studies in this field were published. There are three reasons for such vigorous development in this field: thermochemical processes are extremely widespread; broad practical introduction of laser thermochemistry; the close relationship of this field and fundamental scientific problems lying at the forefront of present-day research in physics. A fundamental discovery was that virtually any chemical medium in which the self-organization phenomenon is initially absent acquires a capacity for self-organization if it is placed in a field of laser radiation. The range of problems dealt with in laser thermochemistry is constantly expanding. New ideas and new objects of research are appearing. Each passing year it is becoming more difficult to select from the literature those studies which are most important for the further development of laser thermochemistry. This review and analysis of the literature is a further continuation of earlier articles of a similar nature published annually in the same journal by the same authors (IZV. AN SSSR: SER. FIZ., Vol 45, p 1018, 1981; Vol 46, p 1150, 1982; Vol 47, p 2000, 1983; Vol 48, p 1485, 1984). The new article is for the most part devoted to the results of research in which the authors themselves directly participated (at least 10 publications by the authors are listed in the bibliography). This is in essence a review of the qualitative aspects of

heating of matter in the case of surface absorption of laser radiation. It is clear that new types of qualitative behavior appear when laser radiation acts on transparent media, when the absorption coefficient is not too great and radiation penetrates a sufficiently great depth in matter. Under the influence of radiation there is a change in the optical characteristics of matter (absorption and refraction coefficients) and the conditions for the propagation of radiation in the medium change. This sort of problem in laser thermochemistry has a number of specific aspects in comparison with traditional problems in nonlinear optics. Figures 4; references 48: 40 Russian, 8 Western.
[411-5303]

UDC 539.4

SOME RESULTS OF EXPERIMENTAL STUDIES OF ICE COVER MECHANICAL PROPERTIES

Moscow MEKHANIKA TVERDOGO TELA in Russian No 2, Mar-Apr 85 (manuscript received 4 Apr 84) pp 182-191

YEPIFANOV, V.P., Moscow

[Abstract] The dynamics of a number of fundamental ice cover processes has never been fully clarified. These involve determination of stress and strain curves, influence of different factors on the mechanical properties of ice and methods for determining the mechanical properties of the ice cover. The in situ and laboratory experiments described in this article constitute some contribution to the needed clarification. The materials presented suggest that the ice cover can be regarded as a plate of nonuniform thickness without clearly expressed interfaces but with substantially different mechanical properties (density, structure and temperature of the layers). When determining mechanical characteristics of the ice cover it is not air temperature which is of such great importance as the temperature distribution in the ice thickness, which (all other conditions being equal), is determined by the prehistory of multiday air temperature changes. Any model representation of the ice cover as a uniform plate is inadequate. In the ice cover there is a quasi-equilibrium of the stressed-strained state (there are constantly changing fields of stresses, strains and temperatures); moreover, relaxation of stress accompanies formation of fissures. Due to the great nonuniformity of the ice cover there will be an asymmetric shape of the stress curve. In any case, for many practical problems the mechanical properties of the thin upper layer of the ice cover are of decisive importance. The method of a free-falling indenter supplied with a piezoelectric accelerometer can be used not only in studying the mechanical properties of the ice cover, but also the mechanism of its destruction. In particular, using interchangeable tips it is possible to simulate interaction between the ice cover and engineering structures. Figures 12, tables 1; references 8: 7 Russian, 1 Western.
[375-5303]

DEEP ANTARCTIC BORING YIELDS ANCIENT SAMPLES

Moscow WORLD SERVICE in English

[Text] Soviet experts boring in the Antarctic have reached the record mark of 2,200 m. The samples they obtained contain microscopic bubbles of air, bacteria, volcanic ash and space dust about 110,000 years old. As researchers study them they obtain more information to clarify the hypothesis of the origin of life on earth.

/9716
CSO: 1865/28

IL-14 PLANES DETERMINE ARCTIC ICE CHARACTERISTICS

Moscow TASS in English 1141 GMT 23 Aug 85

[Text] Leningrad. Specialists of the Soviet Ice Reconnaissance Service who started today the strategic survey of the Soviet Arctic sector are to fly over a territory of 5 million square kilometers between the Eurasian coast and the central polar basin.

The task of the expedition which has at its disposal two specially equipped "IL-14" planes is to draw up maps of the distribution of ice fields and to forecast probable conditions for autumn navigation along the Northern Sea Route--the shortest navigable sea lane connecting northern European ports and the Pacific Ocean. By the end of the month planes of the ice reconnaissance service will fly hundreds of hours over the Arctic and will cover many thousands of kilometers. It is planned to fly to the North Pole--the top of the globe, in order to drop mail to polar explorers on the drifting research stations "North Pole--26" and "North Pole-27."

Ice reconnaissance has become an indispensable part of the scientific exploration of the Arctic and of practical navigation along the Northern Sea Route--the longest national sea lane. Hydrologists have developed a method of the accurate measurement from the plane of the strength, age and state of the ice cover. Ice reconnaissance planes annually cover hundreds of thousands of kilometers. They make strategic surveys of the route, do the tactical reconnaissance by flying in front of convoys, give take-off orders to helicopters stationed on icebreakers. Ice reconnaissance ensured the success of the voyage by the "Arktika" nuclear-powered icebreaker to the North Pole in August 1977, helped pilot out dozens of ships caught in heavy ice off the Chukotka coasts two years ago and made it possible to start nearly round-the-year navigation in the Kara Sea.

Today ice reconnaissance pilots rely not only on their experience, but also on sophisticated instruments which are capable of determining ice characteristics from high altitude, in the darkness of the polar night, under any weather conditions. The new multi-purpose plane "AN-74" will soon be put into service in the Arctic. It will be able to fly with a wheel or a ski undercarriage and to take off from unprepared ground and drifting ice.

/9716
CSO: 1865/28

ANTARCTIC RESEARCHERS

Moscow TASS in Russian 1353 GMT 16 Nov 85

[Summary] Leningrad. The new research season has begun in the Prince Charles Mountains, in Mac Robertson Land, Eastern Antarctic. Having de-mothballed the scientific station, geologists and geophysicists of the 31st Soviet Antarctic Expedition have started their work. The region adjoining the Lambert glacier shelf is known for the rare combination of ancient crystalline rocks of the Antarctic crust and comparatively young sedimentary strata, enabling the geological history of the continent to be studied. "In addition, Soviet scientists have here discovered and mapped promising deposits of valuable ores, minerals and coal." Professor Yevgeniy Korotkevich, leader of the Soviet Antarctic program, says that at the height of the summer research season--which has begun earlier than usual this year--over 100 scientists and specialists have been ferried to the Antarctic by the Leningrad-Antarctic air bridge. A radiogram has been received announcing the arrival at Komsomolskaya station, 1,000 km from the coast, of a convoy of 14 caterpillar-tracked cross-country vehicles with trailers and caravans on runners, transporting the research group and aviation specialists, who are to equip the airstrip to receive the flying laboratory aircraft. The convoy continued its way to the Vostok station. Several more such convoys with scientific groups of geophysicists, magnetologists, and glaciologists are preparing to leave Mirnyy observatory. Meanwhile, the diesel-electric "Kapitan Gotskiy" left for Antarctica, the latest of the Soviet Antarctic fleet of seven ships of varying types.

/9716
CSO: 1865/80

31ST SOVIET ANTARCTIC EXPEDITION

Moscow DOMESTIC SERVICE in Russian 1800 GMT 22 Sep 85

[Summary] The 31st Soviet Antarctic Expedition is preparing for the long journey to Antarctica, where participants will conduct major scientific and transport operations. Around 1,300 scientists of various kinds have been involved in it. They will engage in observations in the field of aerometeorology, geophysics, glaciology, oceanography, biology and other earth sciences. Crossings of the continents by trains of sleds and tracked vehicles and research into a new method of building moorings on ice barriers are planned. "Colleagues from the GDR will stay on to winter at the seven permanent Soviet south polar stations in addition to our scientists."

/9716
CSO: 1865/28

ANTARCTIC CRUISE PLANS OF RESEARCH SHIPS 'VIZE' AND 'ZUBOV'

Moscow VODNYY TRANSPORT, 21 Nov 85 p 4

[Article by G. Bregman]

[Excerpt] The scientific ship "Professor Vize," which is enlisted in the 31st Soviet Antarctic Expedition (SAE), is on its way from Leningrad to the southern oceans, for the 13th time. A motor ship of the same type, the "Professor Zubov," will soon leave the Neva harbor. It will be making its 12th Antarctic cruise.

"These vessels' long voyages are connected, as before, with learning more about natural processes and phenomena occurring in the Far South," related N. Kornilov, deputy director of the Arctic and Antarctic Scientific Research Institute, in an interview with our correspondent. "A special scientific program, 'Polyarnyy eksperiment--Yug' (POLEKS--Yug), was drafted at our institute. This program inaugurated a new stage in the comprehensive study of the vast area of waters of the southern oceans, beginning in 1975.

"During the past 10 years, participants in cruises of the 'Professor Vize' and 'Professor Zubov' have studied energy exchange and large-scale interaction between the ocean and the atmosphere, the structure and dynamics of the Antarctic Circumpolar Current, the mechanism of formation of bottom and intermediate waters and their role in the ocean's global circulation, features of hydrologic and ice conditions, floor relief, biological resources...

"Soviet scientists and seamen will now operate in a region that is completely new to them. It is the western part of the Pacific sector of the Antarctic. Under the command of captains Yu. Burmistrov and V. Uzolin, the expeditionary vessels 'Professor Vize' and 'Professor Zubov' will visit this region at two stages of their cruise.

"In line with the 'POLEKS--Yug' program, hydrologic, geophysical, hydrobiological and other investigations will take place in the water-circulation area of Ross Sea. They will be under the direction of S. Pryamikov, a young polar oceanographer. In difficult navigation conditions, the vessels' crews will support not only diverse studies but also transport operations at a number of permanent Soviet scientific bases located in various places on the Antarctic coast, in line with the plans of the 31st SAE."

FTD/SNAP
/9716
CSO: 1865/91

WORK OF SCIENTIFIC RESEARCH ICEBREAKER 'SHMIDT' DESCRIBED

Moscow SOVETSKAYA ROSSIYA, 29 Oct 85 p 4

[Article by V. Pankov, correspondent (Murmansk)]

[Excerpt] The "Otto Shmidt," flagship of the Soviet Arctic scientific research fleet and the country's first scientific research icebreaker, came off the slips of the Admiralty Shipbuilding Association five years ago. It has already traveled thousands of miles in the Arctic and has gathered unique scientific information in line with assignments from the Murmansk Territorial Administration for Hydrometeorology and Environmental Control.

I visited the icebreaker in the port of Murmansk after it had returned from a three-month cruise in the Kara Sea.

"Our main purpose is to conduct oceanographic research in areas of the polar seas where ice formation takes place," stated A. P. Nikolayets, the vessel's captain. "The icebreaker performs excellently in these areas. It is truly a ship of science, equipped with the latest in technology."

We toured the ship and looked inside its laboratories. There are 14 in all on board the icebreaker. In these laboratories, scientists perform various types of meteorological, hydrochemical and hydrologic research, and process the data that are obtained, using computers. One of these laboratories is intended for preserving ice. A specially maintained temperature permits the study of Arctic ice in natural conditions. The lifespan of ice is one of the main polar riddles which scientists of the 'Otto Shmidt' are trying to solve.

"You won't see anything like this on any other vessel," said the captain. We were approaching a shaft which passes through the whole body of the ship and is essentially an elevator that runs to the seabed. Various scientific instruments can be lowered through this shaft in polar ice.

B. A. Novikov, assistant captain in charge of scientific work, related that the "Otto Shmidt" has already provided a considerable amount of valuable information for science and for preparing weather forecasts in the area of the Northern Sea Route.

FTD/SNAP
/9716
CSO: 1865

END

[redacted] JPRS-UES-86-004

31 MARCH 1986

USSR Report

EARTH SCIENCES

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

JPRS-UES-86-004

31 March 1986

USSR REPORT

EARTH SCIENCES

CONTENTS

METEOROLOGY

Soviet-Vietnamese Studies of Typhoons From Research Ship
(A. Melnikov; PRAVDA, 18 Dec 85).......................... 1

Selection of Method for Calculating Scattering of Impurities in Atmosphere in Standardizing Release of Radionuclides From High Sources
(N. Ye. Artemova; ATOMNAYA ENERGIYA, No 3, Sep 85)........ 2

OCEANOGRAPHY

Work Off U.S. West Coast Planned for Research Ship 'Vityaz'
(G. Kurov; IZVESTIYA, 17 Dec 85).......................... 3

New Airborne Laser Fluorimeter Tested Successfully
(DOMESTIC SERVICE, 6 Jan 85).............................. 4

Research Ship 'Shtokman' in Indian Ocean for UNESCO Study
(VECHERNYAYA MOSKVA, 31 Dec 85)........................... 5

Prize-Winning Work on Laser Diagnosis of Water Environments
(T. Korsakora; KOMSOMOLSKAYA PRAVDA, 5 Dec 85)........... 6

Geological-Geomorphological and Biological Studies in Caribbean Sea Using Underwater Apparatus (Third Cruise of Scientific Research Vessel 'Rift,' 14 August-13 September 1983)
(V. P. Nikolayev, V. V. Bulyga, et al.; OKEANOLOGIYA, No 5, Sep-Oct 85).. 7

Expeditionary Studies in the Tropical Atlantic Ocean During the 28th Cruise of the Research Vessel 'Akademik Vernadskiy'
(Ye. F. Shnyukov, V. K. Kosnyrev, et al.; OKEANOLOGIYA, No 5, Sep-Oct 85).. 8

Fortieth Cruise of Research Vessel 'Akademik Kurchatov'
(V. I. Voytov; OKEANOLOGIYA, No 5, Sep-Oct 85)............ 8

Determination of Individual Mass of Copepoda by Body Proportions
(V. I. Kuzmicheva; OKEANOLOGIYA, No 5, Sep-Oct 85)........ 9

Continuous Seismic Profiling While Drifting
(V. N. Moskalenko; OKEANOLOGIYA, No 5, Sep-Oct 85)........ 9

Acoustic Method of Estimating Concentration of Nodules on Ocean Floor
(Yu. Yu. Zhitkovskiy, A. I. Zotov, et al.; OKEANOLOGIYA, No 5, Sep-Oct 85).. 10

Mesoplankton Along Bulgarian Coast
(E. I. Musayeva; OKEANOLOGIYA, No 5, Sep-Oct 85).......... 10

Geomorphology of Northern and Central Parts of Shirshov Ridge (Bering Sea)
(Yu. D. Yevsyukov, K. I. Sigova; OKEANOLOGIYA, No 5, Sep-Oct 85).. 11

Hydrocarbons in Water and Suspensions in Pacific Ocean and Bering Sea
(I. A. Nemirovskaya; OKEANOLOGIYA, No 5, Sep-Oct 85)...... 11

Formation of Todorokite and Bernessite in Fe-Mn Nodules of the Black Sea
(L. Ye. Shterenberg, A. I. Gorshkov, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA, No 7, Jul 85).. 12

Lower Miocene Diatoms of the Tropical West Pacific
(E. P. Radionova; IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA, No 7, Jul 85)...................... 13

Amphibolites of Shirshov Ridge (Bering Sea)
(R. M. Yurkova, A. A. Peyve, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA, No 7, Jul 85).. 13

Formation Categories of Oceans and Seas
(Yu. M. Pushcharovskiy; IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA, No 7, Jul 85).................... 14

Nature of Gravity Anomalies in Kuril-Kamchatka Arc-Trench-Ocean System, Exemplified in Southern Kuril Arc
(V. D. Poberezhnyy, V. N. Senachin, et al.; TIKHOOKEANSKAYA GEOLOGIYA, No 4, Jul-Aug 85)............. 15

Dynamics of Contemporary Sedimentation and History of Development of Great Gamov Canyon (Sea of Japan) Based on Underwater Observations
(A. S. Astakhov, V. I. Vasilyev; TIKHOOKEANSKAYA GEOLOGIYA, No 4, Jul-Aug 85)............................. 15

Crustal Models for Various Pacific Ocean Bed Structures
(G. I. Semenova; TIKHOOKEANSKAYA GEOLOGIYA, No 4, Jul-Aug 85).. 16

Probable Influence of Kuroshio Current on Distribution of Radiolarian Shells in Bottom Deposits
(I. M. Popova; TIKHOOKEANSKAYA GEOLOGIYA, No 4, Jul-Aug 85).. 17

Determination of Thickness of Marine Sandy Sediment Wave Agitation Layer by Static Soundings
(N. A. Bogdanov, F. A. Kadik; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA, No 9, Sep 85)... 17

Sedimentation Bodies of Somalian Abyssal Trench Based on Seismostratigraphic Analysis of Geophysical and Deep Drilling Data
(A. Ye. Shlezinger, L. Ye. Shterenberg; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA, No 9, Sep 85).. 18

Determination of Effective Viscosity in Finite-Dimensional Cascade Turbulence Models
(Ye. B. Gledzer, A. L. Makarov; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 9, Sep 85)...... 19

Structure and Mineralogical Composition of Deep-Water Tropical Atlantic Corals
(A. F. Khmelnitskiy, S. A. Kozak; DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI, No 8, Aug 85)...... 19

Method for Determining Technical Parameters of Hydraulic Impact Drive for Underwater Drilling
(I. G. Shelkovnikov, V. Ya. Kipovskiy, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA, No 8, Aug 85)................................. 20

Principles of Tectonic Regionalization and Description of Structural Elements on Tectonic Maps of Water Area
(Yu. A. Kosygin, V. A. Kulyndyshev; GEOTEKTONIKA, No 5, Sep-Oct 85).. 20

New Data on Deep Structure of Mid-Atlantic Ridge at 20°S
(Yu. M. Pushcharovskiy, I. N. Yelynikov, et al.; GEOTEKTONIKA, No 5, Sep-Oct 85).......................... 21

Specifics of Development of Spreading Zones in Contemporary and Paleooceanic Structures
(A. S. Perfilyev, V. V. Kopteva, et al.; GEOTEKTONIKA, No 5, Sep-Oct 85).......................... 22

Deep Magnetic Diapirism of Cuba and Its Structural Significance. Part 1
(V. G. Bovenko, Yu. P. Orovetskiy, et al.; GEOFIZICHESKIY ZHURNAL, No 5, Sep-Oct 85)................. 23

Density Model of Indian Ocean Mantle
(O. M. Rusakov; GEOFIZICHESKIY ZHURNAL, No 5, Sep-Oct 85).. 23

Relationship of Distribution of Hydrochemical Characteristics to Structure and Dynamics of Baltic Sea Waters
(V. V. Kazaryan, V. P. Korovin, et al.; VESTNIK LENINGRADSKOGO UNIVERSITETA: GEOLOGIYA, GEOGRAFIYA, No 21, Sep 85)... 24

Monsoon Variability of Thermohaline Fields and Circulation of Waters in Main Pycnocline in Northwestern Indian Ocean
(V. V. Klepikov; VESTNIK LENINGRADSKOGO UNIVERSITETA: GEOLOGIYA, GEOGRAFIYA, No 21, Sep 85).................... 25

Geochemical Characteristics of Authigenic Iron Sulfides in Black and Caspian Seas
(T. V. Volkova, A. Yu. Mitropolskiy; GEOLOGICHESKIY ZHURNAL, No 5, Sep-Oct 85).............................. 25

Heat Flow Through Bottom in Western Black Sea
(A. D. Duchkov, S. A. Kazantsev; GEOLOGIYA I GEOFIZIKA, No 8, Aug 85)................................ 26

Hydrocarbon Gas-Hydrate Formation Beneath Bottom of Seas and Oceans
(V. Ya. Trotsyuk, I. A. Nemirovskaya; DOKLADY AKADEMII NAUK SSSR, No 4, Oct 85)......................... 27

Concentration of Elements in Ocean as Geochemical Factor
(V. D. Korzh; DOKLADY AKADEMII NAUK SSSR, No 4, Oct 85)... 27

Example of Equivalency of Density Stratification and Rotation Effects
(V. A. Vladimirov; DOKLADY AKADEMII NAUK SSSR, No 2, Sep 85)... 28

Geology of San Vicente Island (Cape Verde Archipelago)
(M. A. Akhmetyev, V. I. Koporulin, et al.; DOKLADY AKADEMII NAUK SSSR, No 2, Sep 85)................ 29

New Mineral Varieties of Hydrotalcite-Manasocite Group--Products of Low-Temperature Conversion of Basalts and Volcanogenic-Sedimentary Rocks on Ocean Floor
(V. A. Drits, N. A. Lisitsyna, et al.; DOKLADY AKADEMII NAUK SSSR, No 2, Sep 85)........................ 29

Magmatism of Major Ocean Morphostructures and Certain Geodynamic Aspects of Its Manifestation
(Ye. V. Sharkov, A. A. Tsvetkov; DOKLADY AKADEMII NAUK SSSR, No 2, Sep 85)................................ 30

North Atlantic Upper Mantle Heterogeneities
(N. Ya. Kunin, S. V. Usenko; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI, No 9, Sep 85)................... 31

Geothermal Studies in Central Indian Ocean Basin
(L. L. Vanyan, A. M. Gorodnitskiy, et al.; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI, No 9, Sep 85).. 31

Scattering Matrix and Integrability of Classical Wave Systems With Additional Motion Integral
(V. Ye. Zakharov, Ye. I. Shulman; DOKLADY AKADEMII NAUK SSSR, No 6, Aug 85)................................ 32

Possibilities of Acoustic Thermography of Biological Objects
(Yu. V. Gulyayev, E. E. Godik, et al.; DOKLADY AKADEMII NAUK SSSR, No 6, Aug 85)........................ 32

Marine Landscape Studies: New Approach to Study of Ocean Environment
(D. Ye. Gershanovich, V. V. Fedorov; IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOGRAFICHESKAYA, No 5, Sep-Oct 85).. 33

TERRESTRIAL GEOPHYSICS

Active Kamchatka Volcano Studied
(TASS, 14 Dec 85).. 34

Seismic Prospecting Without Blasting Tested
(TASS, 23 Dec 85).. 35

Structural Elements on Kamchatka Revealed by Anomalous Magnetic Field
(V. M. Zimin; TIKHOOKEANSKAYA GEOLOGIYA, No 4, Jul-Aug 85).. 36

Layers of Increased Conductivity in Crust and Upper Mantle Beneath Kamchatka
(Yu. F. Moroz; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI, No 9, Sep 85)....................................... 36

PHYSICS OF ATMOSPHERE

Sound Field of a Point Source in Stratified Moving Two-Component Medium
(V. Ye. Ostashev; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 9, Sep 85).................. 38

Transfer of Radiation in Model of Broken Cloud Cover Constructed on the Basis of Poisson Point Flux
(G. A. Titov; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 9, Sep 85).................. 38

Light Scattering in Atmosphere With Nonorthotropic Underlying Surface
(V. A. Zubov, I. N. Minin; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 9, Sep 85)...... 39

Planning of Experiment in Problem of Estimating Intensity of Pollution Sources
(V. V. Penenko, V. F. Raputa, et al.; IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA, No 9, Sep 85).. 39

ARTIC AND ANTARCTIC RESEARCH

Hydrochemical Indicators of Frontal Cyclonic Eddy in Antarctic Circumpolar Current
(A. M. Chernyakova, S. O. Borodkin; OKEANOLOGIYA, No 5, Sep-Oct 85).. 41

Relationship of Elastic Moduli of Moisture-Saturated Frozen Sandy-Clayey Rocks and Ice
(A. D. Frolov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA, No 8, Aug 85)........... 41

Impact Fracture of Ice
(V. P. Yepifanov; DOKLADY AKADEMII NAUK SSSR, No 3, Sep 85).. 42

Geodynamic Reconstructions as Method for Predicting Oil and Gas Content of Poorly Studied Regions (as Exemplified by Antarctic)
(Ye. R. Aliyeva, Ye. V. Kucheruk; IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA, No 9, Sep 85)......... 43

New Arctic Drifting Station, SP-28, Planned
(A. Ryabushev; IZVESTIYA, 29 Nov 85)...................... 44

Divers in Pressure Chamber on Board Vessel 'Sprut'
(MEDITSINSKAYA GAZETA, 18 Dec 85)......................... 45

IL-18D Airplane Used in Antarctic Exploration and Transport
(T. Nikitina; VOZDUSHNYY TRANSPORT, 21 Dec 85)............ 46

SP-28 Arctic Drifting Station to Start Operation in April
(I. Podshivalov; SOVETSKAYA ROSSIYA, 28 Dec 85)........... 47

SOVIET-VIETNAMESE STUDIES OF TYPHOONS FROM RESEARCH SHIP

Moscow PRAVDA in Russian 18 Dec 85 p 6

[Article by A. Melnikov, Vladirostok]

[Excerpt] For nearly four months, an international crew studied typhoons that are spawned in the South China Sea.

Soviet scientists were joined by meteorologists of Vietnam on board the vessel "Priboy" of the Far Eastern Scientific Research Institute of the USSR State Committee on Hydrometeorology and Monitoring of the Natural Environment. Research was conducted in line with a program of a Soviet-Vietnamese laboratory for study of tropical cyclones.

The cruise proved to be very useful for specialists of both countries, who have been engaged in joint studies of this important problem for five years. The material that was gathered contains information for the development of a method of predicting typhoons.

"From the scientific standpoint," related Candidate of Geographical Sciences N. Lisogurskiy, the head of the expedition, "the latest cruise produced more than previous cruises did. For example, in August, which is the traditional 'typhoon month,' not a single one was spawned. But in September, when the ship was in the Pacific Ocean, there were six tropical cyclones, four of which reached the Soviet Far East. It happened that the ship was located in the center of one of them, which was named 'Val,' at the moment that it formed. This provided us with a wealth of information for the study of conditions of the origin and evolution of tropical cyclones."

FTD/SNAP
/12947
CSO: 1865/154

UDC 621.039.583:551.5

SELECTION OF METHOD FOR CALCULATING SCATTERING OF IMPURITIES IN ATMOSPHERE IN STANDARDIZING RELEASE OF RADIONUCLIDES FROM HIGH SOURCES

Moscow ATOMNAYA ENERGIYA in Russian Vol 59, No 3, Sep 85
(manuscript received 13 Aug 84) pp 216-221

ARTEMOVA, N. Ye.

[Abstract] Well-established methods exist in the USSR for calculating necessary smokestack height and maximum admissible emissions to maintain the maximum admissible concentration of harmful substances near the ground in the area surrounding an industrial enterprise or power plant for chemical substances and compounds for which maximum admissible concentrations exist. This article discusses methods suitable for making equivalent determination for radioactive elements. The modifications of the Gaussian model of dispersion of radionuclides around a source utilized in the USSR have not been tested at specific sites or in special experiments. The method of calculating the dilution factor developed by the State Committee for Hydrometeorology is recommended for formulating methods for standardizing the emission of radionuclides. The method is oriented toward definition of scientifically well-founded emission levels to assure radiation safety standards are not exceeded under any weather conditions. All types of continuously acting high sources are covered by the method. Details of the method are not described. Figures 3, tables 2; references 19: 12 Russian, 7 Western. [44-6508/12947]

OCEANOGRAPHY

WORK OFF U.S. WEST COAST PLANNED FOR RESEARCH SHIP 'VITYAZ'

Moscow IZVESTIYA in Russian 17 Dec 85 p 6

[Article by G. Kurov, Novorossiysk]

[Text] The crew of the scientific research ship "Vityaz" has completed an anniversary cruise, its 10th. The last days of 1985 are again busy ones: the "Vityaz" will set out shortly on a new expedition.

Senior mate Yuriy Sergeyevich Yefanov told about what the crew of the "Vityaz" worked on during its last cruise, and what is in prospect for the new cruise.

"The 'Vityaz' worked in the Central Atlantic, off the coast of Western Sahara, and in the Mediterranean Sea. The mighty Gulf Stream ocean current or, more precisely, processes of heat exchange between it and the atmosphere, became a main object of research.

"A substantial portion of our work was done in the area of the Bermuda Triangle. A drop in the temperatures of deep currents as compared with readings obtained in 1984 from the 'Akademik Kurchatov' was recorded, and a number of other interesting observations were made.

"We shall set out on our next cruise, the 11th, in the first days of the new year. It will be the first time in the Pacific Ocean for the new 'Vityaz'. We shall work in the vicinity of the California coast, which is a promising area for specialists in the fields of deep currents, global tectonics, and marine fauna."

FTD/SNAP
/12947
CSO: 1865/116

NEW AIRBORNE LASER FLUORIMETER TESTED SUCCESSFULLY

Moscow DOMESTIC SERVICE in Russian 1300 gmt 6 Jan 85

[Summary] Scientists at Yerevan University have created a new laser instrument, a fluorimeter, designed for research in water environments. The reflected beam of the laser breaks down into sixteen colours, which carry onto a display data about the capacity of reservoirs, their plant life and the composition of organic matter. The data is processed by a microcomputer. The instrument may be used to probe rivers, lakes and seas from aboard a helicopter or a plane. It was tested successfully in the course of research in the Baltic Sea at the Klaipeda Hydrometeorological Observatory and with its help biological research was carried out at the mountain Lake Sevan in Armenia.

/12947
CSO: 1865/147-E

RESEARCH SHIP 'SHTOKMAN' IN INDIAN OCEAN FOR UNESCO STUDY

Moscow VECHERNYAYA MOSKVA in Russian 31 Dec 85 p 2

[Excerpt] From on board the scientific research ship "Professor Shtokman" of the USSR Academy of Sciences' Oceanology Institute imeni Shirshov, expedition leader Yu. Pavlidis reported to us today:

"Our expedition is heading for work to be done under a UNESCO program. We will conduct geological and geophysical studies of the shelf zones of countries which are located in the western part of the Indian Ocean.

"Taking part in the expedition are 12 Moscow scientists--from the Oceanology Institute, Moscow State University, and the USSR Academy of Sciences' Geography Institute, as well as specialists from the German Democratic Republic. Very soon, we will take on board an oceanologist from France.

"This ship has already passed through the Red Sea and the Gulf of Aden and entered the Indian Ocean. Today, we passed the island of Socotra.

"We are tuning up instruments and getting ready for research in the first area--the Seychelles Bank."

FTD/SNAP
/12947
CSO: 1865/154

PRIZE-WINNING WORK ON LASER DIAGNOSIS OF WATER ENVIRONMENTS

Moscow KOMSOMOLSKAYA PRAVDA in Russian 5 Dec 85 p 1

[Article by T. Korsakora]

[Abstract] The article salutes a group of scientists who were recently awarded the Leninist Communist Youth League Prize for development of laser methods for diagnosing the condition of natural water environments. Yevgeniy Baulin, Andrey Abroskin, Azret Bekkiyev, Andrey Demidov, Olga Kalaydzidis, Tatyana Gogolinskaya, Valeriy Slobodyanin and Aleksandr Chekalyuk are identified as the members of this group. They worked under the direction of Doctor of Physical-Mathematical Sciences Viktor Vladimirovich Fadeyev. It is noted that the majority of the group's members are or have been associated with the Chair of Quantum Radiophysics of Moscow State University's School of Physics. This chair is headed by Academician Leonid Veniaminovich Keldysh.

It is recalled that the idea of using lasers for the study of biological objects was proposed by Academician Rem Viktorovich Khokhlov. Work on the new diagnostic methods began about 10 years ago. These methods are said to employ a laser carried on a research ship. This laser emits a green light pulse, which is reflected by the water. The presence and type of impurities in the water are indicated by the color of the reflected light. Work on the development and testing of the laser methods was done in a laboratory and then during cruises to the tropics.

FTD/SNAP
/12947
CSO: 1865/116

UDC 551.46.01

GEOLOGICAL-GEOMORPHOLOGICAL AND BIOLOGICAL STUDIES IN CARIBBEAN SEA USING UNDERWATER APPARATUS (THIRD CRUISE OF SCIENTIFIC RESEARCH VESSEL 'RIFT,' 14 AUGUST-13 SEPTEMBER 1983)

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85 pp 876-879

NIKOLAYEV, V. P., BULYGA, V. V., POPOV, V. A., FOYO, Kh. and KLARO, R.

[Abstract] The major scientific tasks of the expedition mentioned in the title, planned on the basis of a suggestion by the Oceanology Institute, Cuban Academy of Sciences, included: study of the geological-geomorphological structure of the boundary of the shelf and island slope; determination of the significance of submarine canyons in the dynamics of bottom sediments; determination of the species composition, zonality and certain aspects of behavior of fish and invertebrates and determination of the influence of environmental factors on the composition and distribution of island slope biocoenoses. The cruise involved the use of an autonomous manned submersible called "Argus" and a deep-water towed apparatus, the "Zvuk-4M." Studies were restricted to an area immediately around the island of Cuba, extending from Matanzas around the western end of the island to Trinidad. During 39 days spent around the island, "Argus" performed 45 dives to as deep as 600 m and the "Zvuk-4M" descended 18 times to as deep as 1,200 m, making over 6,000 underwater photographs and bringing up more than 40 biological and geological specimens, as well as several objects of archeological interest. Significant variations in steepness of the island slope with depth were observed in all areas studied. For the first time in Cuban waters, direct observations of the distribution, composition and certain aspects of ecology of fauna on the island slope at depths of 30 to 600 m allowed estimation of the number and distribution of individual benthos organizations over extensive areas. On one dive, the "Argus" observed what appeared to be the remains of a submerged city, with walls, collapsed roofs, open rectangular areas and arches on Ampere Seamount. Figures 3.
[72-6508/12947]

UDC 551.46.07

EXPEDITIONARY STUDIES IN THE TROPICAL ATLANTIC OCEAN DURING THE 28TH CRUISE OF THE RESEARCH VESSEL 'AKADEMIK VERNADSKIY'

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85 pp 874-876

SHNYUKOV, Ye. F., KOSNYREV, V. K., STAROSTENKO, V. I., MOISEYEV, G. A., MITROPOLSKIY, A. Yu. and REPETYN, L. N.

[Abstract] In January-April of 1984 the marine Hydrophysics Institute, Ukrainian Academy of Sciences, undertook expeditionary studies in the tropical Atlantic as a part of the interdepartmental program studying the interaction between the atmosphere and ocean in order to develop long-range weather forecasts and climate theory. The studies were concentrated in the Amazon tropical energy-active zone, the shelf zone of Guinea, the transoceanic cross-section along 12°N and in the areas of transform faults of the Mid-Atlantic Ridge. An extensive range of hydrophysical, hydrochemical, geological, geochemical and geophysical studies was undertaken, as well as studies of the influence of sea water on the corrosive properties of materials and coatings. Two hundred sixty-two drift stations were occupied, studying the structure of hydrophysical and hydrochemical fields down to 2,000 m depth. Bottom samples were taken at 120 of these stations, and at 40 the precise vertical structure of the temperature field and conductivity (salinity) were measured. Eleven drifting buoy stations were used to measure currents and water temperatures. Geophysical studies of the gravity and magnetic fields were performed throughout the entire cruise. The data obtained in the Amazon area convincingly indicate that this area of the tropical Atlantic is an important energy-active zone from the standpoint of advective heat and mass transfer processes. Figures 1.
[72-6508/12947]

UDC 551.46.07

FORTIETH CRUISE OF RESEARCH VESSEL 'AKADEMIK KURCHATOV'

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85 pp 872-874

VOYTOV, V. I.

[Abstract] The 40th cruise of the "Akademik Kurchatov" covered the western and tropical Atlantic in the northern hemisphere between 9 August and 22 November 1984. The cruise was 20,000 nautical miles in length, with 168 measurement stations, many of which were occupied in an area in the Gulf Stream at about 38°N, 65°W off the coast of North America. Weather and actinometric observations as well as hydrologic studies were performed in this area. Results of the studies indicated that the ocean transmits heat into the atmosphere in the area the same as in the winter, though less intensely. In an open ocean area at about 22°N, 38°W, studies with a 3-module muon detector recorded cosmic particle fluxes at depths of 1500 to 600 m, both vertically and at an angle of up to 45°. Figures 1.
[72-6508/12947]

UDC 591.93(26)

DETERMINATION OF INDIVIDUAL MASS OF COPEPODA BY BODY PROPORTIONS

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85
(manuscript received 4 Aug 83) pp 867-871

KUZMICHEVA, V. I. All-Union Fishing and Oceanography Scientific Research Institute, Moscow

[Abstract] Previous studies have suggested methods for determining the weight of copepods by measuring body size and proportions, referring to nomograms to determine body volume and assuming that density is equal to one. The method is evaluated by referring to raw data published by previous authors. The dimensions reported in these other studies were used to find the L/ℓ and c/ℓ ratios, determine the body proportion coefficient and calculate mass. The quantities thus calculated were compared to the actual volumes and mass as determined by weighing. Mass was found to be some 6.8% greater than volume. Another correlation is observed over a broad range of sizes and species, with slightly greater dispersion for the smallest animals, probably resulting from the different research techniques employed. Figures 2, tables 2; references: 14 Russian.
[72-6508/12947]

UDC 550.834

CONTINUOUS SEISMIC PROFILING WHILE DRIFTING

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85
(manuscript received 29 Sep 83, after revision 15 May 84) pp 861-866

MOSKALENKO, V. N., Southern Division, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Gelendzhik

[Abstract] Continuous seismic profiling while drifting is a very valuable method, yielding information on bottom structure in the area where geological samples are brought up, allowing correlation of rock specimens with seismic profiles. This requires that two types of seismic apparatus be on board: one for operation with the ship under way, another for operation at geological stations with the ship drifting. The receiving systems used for the two situations are quite different. During the 14th and 25th cruises of the research vessel "Dmitriy Mendeleyev," such work was performed, demonstrating its possibility in principle. These operations are described. The combination of profiles while under power and while drifting allows regional seismic cross-sections to be obtained without gaps in the most important areas, those where geological operations are performed and samples taken while drifting. Figures 1; references: 4 Russian.
[72-6508/12947]

UDC 534.26

ACOUSTIC METHOD OF ESTIMATING CONCENTRATION OF NODULES ON OCEAN FLOOR

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85
(manuscript received 24 May 84; after revision 22 Aug 84) pp 856-860

ZHITKOVSKIY, Yu. Yu., ZOTOV, A. I., KRASNOBORODKO, V. V., FOKIN, A. V. and CHEPURIN, Yu. A., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] The method for estimating the concentration of nodules on the ocean floor by the amount of penetration of sound into the floor has been known for some time. The authors suggest a method based on studies of the characteristics of acoustic signals backscattered by the ocean floor. Field studies were made in a number of areas in the Pacific Ocean at about 4,000 m to determine the specifics of backscattering of sound from a bottom covered with nodules. Studies involved both standard echo soundings at 12 kilohertz with a spherical hydrophone located at a depth of 100 m and pulse soundings with a deep-water acoustic system suspended 10 to 60 m above the bottom. The results confirm that measurement of the statistical characteristics of acoustic signals scattered by the bottom can be successfully used to estimate the density of ferromanganese nodules on the bottom. Studies can be made from the ocean surface with the prospecting ship in motion. Figures 2; references 4: 3 Russian, 1 Western.
[72-6508/12947]

UDC 577.475(262.5)

MESOPLANKTON ALONG BULGARIAN COAST

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85
(manuscript received 6 Mar 84; after revision 27 Jun 84) pp 832-838

MUSAYEVA, E. I., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] A study was made of the distribution of mesoplankton during observations carried out in 1982. Materials studied were samples of zooplankton collected on the 11th cruise of the research vessel "Akademik L. Orbeli" in the fall of 1982 in a 30-liter reinforced polyethylene bathometer during the daylight hours in Burgas Bay, October and November. It was found that during the period of the study the plankton over most of the water area off the coast of Bulgaria was in a typical autumn state, with low biomass, small numbers of larvae of benthic animals and a number of summer neritic species. In terms of biomass, Oithona minuta, Acartia clausi and at some stations other animals dominated. In mid-November, Noctiluca miliaris became quite numerous along the coast. Only in the southern portion of the bay, due to constant eutrophication, are communities with rich development of phytoplankton and massive reproduction of Oithona developed in the autumn. Figures 3, tables 2; references 9: 5 Russian, 4 Western.
[72-6508/12947]

UDC 551.462(268.5)

GEOMORPHOLOGY OF NORTHERN AND CENTRAL PARTS OF SHIRSHOV RIDGE (BERING SEA)

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85
(manuscript received 26 Jul 85; after revision 13 Jun 84) pp 809-812

YEVSYUKOV, Yu. D. and SIGOVA, K. I., Southern Division, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Gelendzhik

[Abstract] Echo soundings performed during the 29th cruise of the research vessel "Dmitriy Mendeleyev" have provided new data on the relief of Shirshov Ridge. The ridge is subdivided into the northern, central and southern blocks. The author studied only the northern and central blocks, with a total length of 220 nautical miles, two-thirds the length of the entire ridge. Analysis of available materials revealed the following characteristic relief elements: the peak surface, slopes, foot, ridges, trenches, slope bends, terrace-like steps and scarps. A diagram illustrates the primary structures and depths and a map illustrates the area covered by the studies. The western slope is steep, broken and complicated with large ridges and trenches, sometimes of the graben type. The eastern slope is smoother, with some scarps and terraces, generally more gently sloping. A saddle, probably a large fracture, separates the ridge into the northern and central blocks, the southern block being 400-600 m lower than the remainder. Tectonic processes were responsible for the formation of the shape of the ridge. Figures 1, references 8: 6 Russian, 2 Western.
[72-6508/12947]

UDC 551.464

HYDROCARBONS IN WATER AND SUSPENSIONS IN PACIFIC OCEAN AND BERING SEA

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85
(manuscript received 8 Jun 83; after revision 24 Sep 84) pp 761-767

NEMIROVSKAYA, I. A., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] On the 29th cruise of the "Dmitriy Mendeleyev" in June-July 1982, organic compounds soluble in carbon tetrachloride or chloroform were analyzed in sea water and suspended matter from various depths. Data on the concentration of hydrocarbons in organic matter can be used to monitor ocean pollution and establish the background level of such compounds for future monitoring. The mild extraction conditions used were intended to maintain the organic matter in minimally altered condition. It is found that hydrocarbons entering the hydrosphere as a result of petroleum pollution or formed in sea water enter in the same transformation processes. In productive regions where large quantities of hydrocarbons are synthesized and may be formed in biochemical processes, their concentration may exceed the maximum admissible concentration

of 50 micrograms per liter. Combined biogeochemical studies are required to provide a reliable judgment concerning the degree of oil pollution of sea water and trace the dynamics of pollution. Figures 1, tables 2; references 12: 7 Russian, 5 Western.
[72-6508/12947]

UDC 553.21(262.5)

FORMATION OF TODOROKITE AND BERNESSITE IN Fe-Mn NODULES OF THE BLACK SEA

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian No 7, Jul 85 (manuscript received 28 Mar 84) pp 94-98

SHTERENBERG, L. Ye., GORSHKOV, A. I., DUBININA, G. A., SIVTSOV, A. V., and TOLOKNEVA, L. M., Geology Institute, USSR Academy of Sciences, Moscow; Microbiology Institute, USSR Academy of Sciences; Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry Institute, USSR Academy of Sciences, Moscow; Oceanology Institute, USSR Academy of Sciences, Southern Division, Gelendzhik

[Abstract] Previous studies have concluded that compact Fe-Mn nodules from lakes and oceans are formed by similar mechanisms due to the similarity of their lithologic and geochemical composition. Direct microbiological observation of marine nodules have not been undertaken until now. To fill this gap, a study was made to determine the intensity of microbiological reduction processes in the neighborhood of Kalamitskiy Bay of the Black Sea where researchers have reported that Fe-Mn nodules are formed most extensively. In the Black Sea nodules, iron always predominates over manganese, being present in oxidized form. Specimens of bottom deposits containing Fe-Mn nudules were collected by bottom dredge at two locations in Kalamitskiy Bay in 1982 from the research vessel "Akademik Orbeli." The microbiological data indicated intensive processes occurring in the nodules themselves, forcing the authors to analyze specifics of their structure in order to find microzones in which araerobic microorganisms could function. When nodules were fractured, small light gray clay inclusions, primarily hydromica, were found. The formation of minerals containing Mn^{2+} in the internal portions of Black Sea Fe-Mn nodules is thought to result from diagenetic transformation of raw materials occurring with the direct participation of various microorganisms. Figures 4, tables 1; references 11: 10 Russian, 1 Western.
[39-6508/12947]

UDC 561.26:551.782.11(265/266)

LOWER MIOCENE DIATOMS OF THE TROPICAL WEST PACIFIC

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian No 7, Jul 85 (manuscript received 8 Jun 84) pp 62-73

RADIONOVA, E. P., Geology Institute, USSR Academy of Sciences, Moscow

[Abstract] This survey of the (mostly American) literature discusses Lower Miocene diatoms of the tropical western Pacific. It is noted that by the beginning of the Middle Miocene the composition of diatomaceus flora was similar to the present composition, indicating that the Late Oligocene--Early Miocene stage was the time of appearance of those genera of diatoms most actively developed in the Neogene. Zones of Lower and Middle Miocene diatom complexes are associated with specific geological periods. The most important event in the development of diatoms in the first half of the Early Miocene was the evolutionary development of the genus Actinocyclus. In the second half of the Early Miocene the number of representatives of this genus was significantly reduced, the complex being dominated by the genus Cestodiscus. In the Upper Early and Lower Middle Miocene, monotypical genera developed with short intervals of dominance. By the bottom of the Middle Miocene, Coscinodiscus pseudoincertus and C. blysmos were widespread. Climatic fluctuations doubtless influenced the sequence of the species. Evolutionary and climatic changes of diatoms are common for the tropical Pacific. Figures 3, tables 1; references 26: 4 Russian, 22 Western.
[39-6508/12947]

UDC 552.32(262.5)

AMPHIBOLITES OF SHIRSHOV RIDGE (BERING SEA)

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian No 7, Jul 85 (manuscript received 10 May 84) pp 9-27

YURKOVA, R. M., PEYVE, A. A., ZINKEVICH, V. P. and CHERKASHIN, V. I., Geology Institute, USSR Academy of Sciences, Moscow

[Abstract] The 29th cruise of the research vessel "Dmitriy Mendeleyev" in the summer of 1982 undertook a combined geological and geographic study of Shirshov Ridge at the juncture of the Aleutian and Komandorskiy trenches in the Bering Sea, an area previously little studied. This article discusses amphibolites and related rock formations brought up by dredging from the vessel. The mineralogy, petrochemistry and geochemistry of the rocks are discussed. The conditions of formation of the samples found are analyzed. The data on the nature and conditions of formation of metamorphic rock on the Bering Sea floor reveal the major stages of metamorphism and their significance in the tectonic development of Shirshov Ridge. In the western Bering Sea at the end of the Early Cretaceous and beginning of the Late Cretaceous, the

formation of the oceanic crust and emergence of tholeiitic basalts began. In the Late Cretaceous and Early Paleogene this region was separated from the remaining portion of the Pacific due to the onset of formation of the Aleutian Island system. In the east, destruction of the previously existing crust was compensated by the development of the Shirshov folded zone; in the west and northwest, ocean formations were thrust over the continental margin. Local dilatational processes later resulted in the appearance of subhorizontal tectonic discontinuities both in the crust and at its boundary with the mantle. The most probable mechanism explaining the formation of the amphibolites is disperse spreading in the western Bering Sea with subsequent movement to the east within the Shirshov folded zone. The specific mechanism of this spreading is not presently known. Figures 5, tables 6; references 36: 22 Russian, 14 Western.
[39-6508/12947]

UDC 551.46:551.24

FORMATION CATEGORIES OF OCEANS AND SEAS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian No 7, Jul 85 (manuscript received 8 Jan 85) pp 3-8

PUSHCHAROVSKIY, Yu. M., Geology Institute, USSR Academy of Sciences, Moscow

[Abstract] The article focuses on the fact that the ocean basins differ significantly in their dimensions, from which follow many differences in their geological properties, particularly formational composition. Four major categories of ocean basins are distinguished: small basins, mesobasins, megabasins and superbasins. Each of these categories is interpreted briefly. There is but one superbasin, the Pacific Ocean. The Atlantic and Indian Oceans are megabasins, as was the Kazakhstan-Siberian Ocean which existed some 600 million years ago. Mesobasins are distinguished from megabasins in that they are smaller and simpler in structure. The Eurasian basin in the Arctic is a present example, the Turkestan Paleozoic ocean is an example from the past. Small ocean basins are sometimes referred to as marginal seas, but this is incorrect. Several examples of ancient small ocean basins are listed. Tables 1; references 15: 13 Russian, 2 Western.
[39-6508/12947]

UDC 550.831:551.241(265)

NATURE OF GRAVITY ANOMALIES IN KURIL-KAMCHATKA ARC-TRENCH-OCEAN SYSTEM, EXEMPLIFIED IN SOUTHERN KURIL ARC

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 85
(manuscript received 22 Feb 85) pp 113-117

POBEREZHNYY, V. D., SENACHIN, V. N., SUSHEKOV, Yu. A. and KOSYGIN, V. Yu., Marine Geology and Geophysics Institute, and Far Eastern Scientific Center, USSR Academy of Sciences, Novoaleksandrovsk

[Abstract] The author characterizes the determination of the nature of tectonic dislocations which have generated and which maintain isostatic anomalies as tectonic interpretation of the gravity field. Observed gravity anomalies are the result of the tectonic life in a region. More detailed information now available on the gravity field of the Southern Kuril portion of the Kuril-Kamchatka arc-trench-ocean system, obtained aboard the research vessel "Pegas" in 1976-1977, have allowed interpretation of observed anomalies at a qualitatively new level. The interpretations were based on free-air anomalies. Large positive and negative free-air anomalies indicate significant disruption of the isostatic state of the crust in the region studied, where the continent and ocean lithosphere blocks are joined. The observed gravity anomalies result primarily from the major morphostructural arc-trench system. Gravity anomalies in the arc-trench system cannot be considered separately from the geodynamic situation of the region. Calculations based on deep seismic soundings have shown that the nature of the gravity field is attributable primarily to the anti-isostatic model of the deep structure of the arc-trench system. Figures 2; references 26: 23 Russian, 3 Western.
[67-6508/12947]

UDC 551.35(265.54)

DYNAMICS OF CONTEMPORARY SEDIMENTATION AND HISTORY OF DEVELOPMENT OF GREAT GAMOV CANYON (SEA OF JAPAN) BASED ON UNDERWATER OBSERVATIONS

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 85
(manuscript received 26 Nov 83) pp 13-18

ASTAKHOV, A. S. and VASILYEV, V. I., Pacific Ocean Oceanological Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

[Abstract] Results are presented from studies of Gamov Canyon performed from an underwater habitat in 1979 and 1982, studying the morphology, lithodynamic processes, stratigraphy and conditions of deposition of Late Cenozoic deposits. The main bed of the canyon begins at depths of 90-95 m as a valley a few meters deep and some tens of meters in width with gently sloping sides. At about 250-300 m, the canyon bed takes on a U-shaped cross-section with a flat

bottom up to 150 m wide with mean side slopes of about 5 degrees. The canyon and its tributaries are cut into sedimentary Neogene-Quaternary deposits. There are two levels of Pleistocene formations. Several major periods of formation of the canyon can be distinguished on the basis of morphological features, lithology and stratigraphic position and the nature of contemporary lithodynamic processes. The sedimentary mass in which the canyon is cut was formed in the Miocene. The major valley of the canyon and its lateral tributaries were formed in the Pliocene and Early to Middle Pleistocene. Partial filling of the upper part of the canyon occurred during a regressive period of the Late Pleistocene. Figures 3; references: 7 Russian. [67-6508/12947]

UDC 551.1:550.834.32(265)

CRUSTAL MODELS FOR VARIOUS PACIFIC OCEAN BED STRUCTURES

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 85 (manuscript received 19 Aug 83) pp 3-12

SEMENOVA, G. I., Earth Physics Institute, USSR Academy of Sciences, Moscow

[Abstract] A comparison of seismic data in order to study lateral heterogeneities in crustal structure is possible only using the major parameters revealed by a variety of field methods and various interpretation approaches. This article summarizes deep seismic sounding data from the Pacific Ocean crust and suggests a plan for regionalization of the crust reflecting the major features of its lateral heterogeneity. In the process of summarizing the seismic materials, histograms of values of crustal parameters of individual geomorphological structures were first constructed, then groups of structures were studied with similar distributions of parameters. The regionalization map, together with models of the crust in the areas in question, reflects the essential lateral heterogeneity of the Pacific Ocean floor crust and represents a three-dimensional model at the present level of understanding. Figures 2, tables 2; references 34: 24 Russian, 10 Western. [67-6508/12947]

UDC 551.353.3

PROBABLE INFLUENCE OF KUROSHIO CURRENT ON DISTRIBUTION OF RADIOLARIAN SHELLS IN BOTTOM DEPOSITS

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 85 (manuscript received 21 Jul 83) pp 104-107

POPOVA, I. M., Far Eastern Geology Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

[Abstract] This article describes the first results of studies of possible displacement of radiolarian shell associations relative to the locations where the radiolarians lived. The purpose of the study was to demonstrate mathematically conditions under which transfer and deposition of radiolarian shells would be possible. The weight and dimensions of the shells and water velocity at various depths were considered. The equations indicate that radiolarian shells could drift 500-2500 km, which could explain finding of tropical species in sediments in subtropical and boreal areas. The slopes of underwater elevations and island arcs, as well as deep-water depressions, might serve as traps for radiolarian shells. Earlier reports have stated that the families Actinommidae, Phacodiscidae, Lithelidae, and Sethphormididae live in the aphotic layer and would thus experience the least influence of ocean currents. The families Pterocorythidae, Cannobotrydae, Arthostrobiidae and Sphaerozoidae live near the surface and thus might be carried considerable distances. Figures 3; references 6: 4 Russian, 2 Western.
[67-6508/12947]

UDC 553.068.56

DETERMINATION OF THICKNESS OF MARINE SANDY SEDIMENT WAVE AGITATION LAYER BY STATIC SOUNDINGS

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA in Russian No 9, Sep 85 pp 39-43

BOGDANOV, N. A. and KADIK, F. A., All-Union Scientific Research and Production Institute for Mining of Nonferrous Metals

[Abstract] A study was made to determine the distribution of thickness of the layer in which wave action affects marine sediment on the basis of an analysis bottom relief elements under the influence of storms of various force, for subsequent development of a technology for mining of minerals from this type of marine placer deposit. The bottom of the wave action zone is marked by a sharp change in sediment density, sorting factor, content of smaller fractions and quantity of larger fractions. The static soundings method is sensitive to changes in all these characteristics. Studies were made on a placer in the Baltic along a slightly concave arc in the coast oriented north-south. Work was done in the summer and fall, during calm weather in summer and stormy

weather in the fall. Analysis of the results indicated that the maximum frontal resistance to a sounding probe decreases with increasing distance from the beach into the sea. Particle-size distribution analysis indicated that all deposits studied were homogeneous, consisting of fine, pulverized sand. Generalized graphs were constructed on the basis of variations in sounding resistance showing that the greatest thickness and density of wave zone deposits are observed at the heads of scallops on the underwater slope, the least on their slopes. The thickness of the wave-disturbed zone decreases seaward from the area where the waves break, increasing with increasing wave action. Figures 2; references: 14 Russian.
[33-6508/12947]

UDC 551.7:550.834

SEDIMENTATION BODIES OF SOMALIAN ABYSSAL TRENCH BASED ON SEISMOSTRATIGRAPHIC ANALYSIS OF GEOPHYSICAL AND DEEP DRILLING DATA

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA
in Russian No 9, Sep 85 pp 3-8

SHLEZINGER, A. Ye. and SHTERENBERG, L. Ye., Geology Institute, USSR Academy of Sciences

[Abstract] In 1980 some 2,736 km of regional seismic profiles were correlated with deep drilling locations. The resulting materials made it possible to discriminate various types of sedimentation bodies and the isolation from tectonic slopes. The surface of the acoustic basement is characterized by intensive low-frequency reflections. The thickness of the sedimentary cover in the trench is up to 2.5-2.8 km, with practically horizontal bedding of strata. In the southeastern part of the trench the acoustic basement is at 7.5-8 km depth, the thickness of horizontal sedimentary layers up to 1.3 km. In the northwestern part of the trench the sedimentary cover is practically horizontal. The lower layers vary in thickness and level the structural relief of the surface of the acoustic basement. The sedimentary cover appears to consist of deposits of the same type throughout the trench. The major clay mineral is montmorillonite. Analysis of the mineralogical composition indicates that the deposits are primarily dark non-calcareous clays with almost no sand or silt deposits. The bedding conditions of geological bodies in the trench and their mineralogical composition indicate that they were formed exclusively during lateral displacements of primarily terrigenous sediments over the bottom of the basin. The source of the sediments was the African continent. Analysis of seismic sections in the trench and neighboring regions of the Arabian-Indian mid-oceanic ridge indicated predominance of lateral-gravitational and hydrogenous origins. References 7: 3 Russian, 4 Western.
[33-6508/12947]

UDC 532.517.4:551.465.15:551.511.6

DETERMINATION OF EFFECTIVE VISCOSITY IN FINITE-DIMENSIONAL CASCADE TURBULENCE MODELS

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian Vol 21, No 9, Sep 85 (manuscript received 14 Mar 84) pp 899-906

GLEDZER, Ye. B. and MAKAROV, A. L., Atmospheric Physics Institute, USSR Academy of Sciences

[Abstract] An approximate study of multistage systems modeling 2-dimensional and 3-dimensional turbulence is undertaken, making it possible to determine the coefficients of effective viscosity corresponding to a finite number of elements in chains under conditions of energy and enstrophy transfer. Relaxation times are obtained corresponding to the current concepts of relaxation models. These plus the friction coefficients determined can be used to study multistage systems with small numbers of elements. Values are obtained analogous to the attached mass coefficients for subsequent levels of the system. References: 10 Russian, 1 Western.
[70-6508/12947]

UDC 593.3:(543+546+549)(261)(160.23)

STRUCTURE AND MINERALOGICAL COMPOSITION OF DEEP-WATER TROPICAL ATLANTIC CORALS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 8, Aug 85 (manuscript received 25 Feb 85) pp 20-23

KHMELNITSKIY, A. F. and KOZAK, S. A., Geological Sciences Institute, Ukrainian Academy of Sciences, Kiev

[Abstract] Fragments of living and dead coral were brought up during the 28th cruise of the research vessel "Akademik Vernadskiy" on the north slope of the Romanche Depression. The corals were Leptogorgia sp. and Isis sp., coral polyps, subclass of 8-ray corals. Coral skeletons as they grow accumulate information on the ecological and hydrochemical changes in the environment. The substance of the corals was studied by microscopic, thermographic, radiographic, gasometric, chemical and spectral methods. The data obtained indicate that the elements Mn, Ni, Co, Cu, Ag and Zn were collected by the living coral from the surrounding environment, while Ti, Cr and Sr were incorporated in the structural lattice. In the deceased coral, Ni, Cr, Cu, Ag and Zn were sorbed while the structural lattice contained Mn, Co, Ti, V, Pb and Sr. In coral covered with a ferromanganese crust, the elements Cr, Ag and Zn are sorbed; the others are part of the structure of the coral, due to long-term soaking of the skeleton in solutions of these elements. The substance of the corals consists 95.5-98% of calcium carbonate. Impurities, representing 2.0-4.5%, consist primarily of Fe_2O_3, P_2O_5 and MnO, as well as

NiO and CoO. Trace elements include several phases sorbed onto the surface, included in the living matter of the corals and firmly attached to the structure of the coral skeleton. Figures 1; references: 5 Russian.
[62-6508/12947]

UDC 622.24.085.5

METHOD FOR DETERMINING TECHNICAL PARAMETERS OF HYDRAULIC IMPACT DRIVE FOR UNDERWATER DRILLING

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA in Russian No 8, Aug 85 pp 112-116

SHELKOVNIKOV, I. G., KIPOVSKIY, V. Ya. and KOCHETOV, S. O., Leningrad Mining Institute

[Abstract] Hydraulic impactors designed by the "Soyuzgeotekhnika" Association and a hydraulic vibrator for the PUVV-150 sample collector designed by the Donets Polytechnic Institute have been successfully used to drill boreholes and take samples from the sea bottom at shallow depths. Theoretical principles have been developed for valve machines of this type. This article, calculates the technical parameters of a drive for stipulated bottom material characteristics, sample diameter and desired sample length. The mass of the striker, ratio of its length to diameter, speed of impact on the anvil, drive power, speed and depth of penetration of the soil pump, mass and dimensions of the drive are determined relative to stipulated bottom material hardness. By using the equations presented in this article, taking into account the geological conditions of the bottom, energy source machine design, one can calculate the major parameters of an impact-type hydraulic drive for any specific case. Figures 3; references: 2 Russian.
[32-6508/12947]

UDC 551.24

PRINCIPLES OF TECTONIC REGIONALIZATION AND DESCRIPTION OF STRUCTURAL ELEMENTS ON TECTONIC MAPS OF WATER AREA

Moscow GEOTEKTONIKA in Russian No 5, Sep-Oct 85 (manuscript received 24 May 83) pp 14-18

KOSYGIN, Yu. A. and KULYNDYSHEV, V. A., Tectonics and Geophysics Institute, Far Eastern Scientific Center, USSR Academy of Sciences

[Abstract] Any tectonic map should utilize the same principle of tectonic regionalization throughout the map. This article examines the tectonic regionalization principle and describes structural elements for several types of land-water maps, including a land-shelf area, ocean floor and land-ocean

floor area. In constructing tectonic maps, including for the ocean floor, problems of joining models of different specializations are particularly significant. Examples of maps successfully achieving this are mentioned, but not illustrated. References 21: 18 Russian, 3 Western.
[57-6508/12947]

UDC 551.242.23(261.264)

NEW DATA ON DEEP STRUCTURE OF MID-ATLANTIC RIDGE AT 20°S

Moscow GEOTEKTONIKA in Russian No 5, Sep-Oct 85 (manuscript received 17 Jan 85) pp 5-13

PUSHCHAROVSKIY, Yu. M., YELYNIKOV, I. N. and PERFILYEV, A. S., Geology Institute, USSR Academy of Sciences; Oceanology Institute, Southern Division, Gelendzhik

[Abstract] Results are presented from processing and interpretation of data on deep multichannel seismic profiling by the reflected waves method over the Mid-Atlantic ridge at 20°S during the seventh cruise of the research vessel "Professor Shtokman". Total profile length was 293 km. The materials were profiled at the computer center of the "Yuzhmorgeologiya" Association, USSR Ministry of Geology, at Gelendzhik. The deep structure of the ridge is similar to the structure of the ridge in other areas, with significant differences. Volcanic cones with lava flows are clearly visible on the ridge slopes. Differences from other sections are discussed and two segments of the seismic profile are presented. The most clearly seen specific feature of the profile consists of zones of hard-plate deformations superimposed on the structure of the third layer in the central and partially in the western segments of the profile. These structures clearly dip to the east and remain within the third layer. The structures may have developed in the process of folding of the third layer of the oceanic crust beneath the axial zone of the ridge, but their genesis cannot be precisely determined at present. Figures 2; references 24: 15 Russian, 9 Western.
[57-6508/12947]

UDC 51.242.23

SPECIFICS OF DEVELOPMENT OF SPREADING ZONES IN CONTEMPORARY AND PALEOOCEANIC STRUCTURES

Moscow GEOTEKTONIKA in Russian No 5, Sep-Oct 85 (manuscript received 20 Jan 84) pp 19-33

PERFILYEV, A. S., KOPTEVA, V. V. and KURENKOV, S. A., Geology Institute, USSR Academy of Sciences

[Abstract] Three features were selected for study of the second layer by direct geological methods: Iceland, the southern Urals, and the Bayan--Khongorskaya zone in Mongolia. The spreading process is found on the basis of these three areas to have certain peculiarities best seen by detailed study of "dike in dike" complexes. The peculiarities found to the common throughout the world and throughout geological history include jumping of magma segregation axis, flank magmatism and a shear component in dilatation. A model of formation of the oceanic crust in spreading zones is proposed. Such phenomena as the shear component, segregation and jumping during spreading are widely found in global structures. All of these peculiarities indicate some common mechanism responsible for their occurrence. A hypothetical model attempts to explain these characteristics. According to the model, at a certain moment "A" the zone of an ascending flow of a hypothetical substance is located directly beneath a spreading rift zone in an upper plate of the lithosphere, forming a magma hearth, producing a "dike in dike" complex. At the next moment the lower mantle plate continues to spread, more or less symmetrically, producing a newly formed mantle plate. The overlying crustal plate shifts relative to the mantle so that the rift is on the flank of the mantle diapir. Finally, the crustal plate shifts with respect to the mantle plate so that the previous spreading axis is beyond the current spreading axis and the magma generation zone is in the mantle plate, causing breaking of the crustal plate and formation of a new spreading axis. Figures 7; references 33: 19 Russian, 14 Western.
[57-6508/12947]

UDC 550.31

DEEP MAGNETIC DIAPIRISM OF CUBA AND ITS STRUCTURAL SIGNIFICANCE. PART 1

Kiev GEOFIZICHESKIY ZHURNAL in Russian Vol 7, No 5, Sep-Oct 85 (manuscript recevied 20 Nov 84) pp 82-93

BOVENKO, V. G., OROVETSKIY, Yu. P., and SHCHERBAKOVA, B. Ye., Geophysics Institute, Ukrainian Academy of Sciences, Kiev; All-Union Geophysics Scientific Research Institute, USSR Ministry of Geology, Moscow

[Abstract] Experimental data were summarized by reinterpretation of previously published materials, consisting primarily of detection in the territory of Cuba of transcrustal acoustical anomalies by statistical filtration. This technique significantly increases the formation content of reflected wave studies in this area. Anomalies are identified with deep magmatic diapirs, primarily of ultrabasic composition. Studies of thirteen profiles throughout the island indicate that the most ancient discontinuities separate the deep magmatic diapirs (anticlinoria) from synclinorial structures. It is concluded that for a long period of time, beginning in the late Cretaceous, events occurred in the region of the modern Caribbean Sea related to active settling, causing Tertiary block tectogenesis in the territory of Cuba. Figures 2; references 37: 36 Russian, 1 Western.
[58-6508/12947]

UDC 550.312

DENSITY MODEL OF INDIAN OCEAN MANTLE

Kiev GEOFIZICHESKIY ZHURNAL in Russian Vol 7, No 5 Sep-Oct 85 (manuscript received 28 Sep 84) pp 61-69

RUSAKOV, O. M., Geophysics Institute, Ukrainian Academy of Sciences, Kiev

[Abstract] The reliability of interpretation of seismic and gravimetric observations in studying crustal structure in the Indian Ocean depends to a great extent on the reliability of separation of the component resulting from global anomalies from the total field. The ambiguity of separation of anomalies can be decreased by the use of quantitative parameters of density heterogeneities on a global scale. As a result of expansion of some 700,000 values of travel-time anomalies in spherical functions, it was possible to determine deviations in seismic wave velocity from a spherically symmetric distribution down to the core-mantle boundary. The major features of the gravity field in the Indian Ocean and its neighborhood in the longest wavelength range were found to result from density heterogeneities in the mantle which are expressed as anomalies in the velocity field. Calculations have shown that the gravity field in the Indian Ocean obtained by expansion up to twelfth-order harmonics is the total gravitational effect of density heterogeneities located at various levels and varying within the limits of

each layer. The first three-dimensional seismogravitational model of the Indian Ocean mantle takes into account the sphericity of the earth and clearly indicates the interference nature of long-wave free-air anomalies in the area studied. The observed picture of changes in gravitational force result from the total gravitational effect of density heterogeneities of the entire mantle, rather than the influence of any single zone or boundary. A significant portion of the Indian minimum results from lateral variations in density in the 670-1,100 km layer. The density model is sensitive to changes in contours of the anomalous masses and the sign on the coefficient $\Delta V/\Delta p$, but is quite stable to fluctuations in $\Delta V/\Delta p$ within the zone. The magnitude and scale of long-wave gravity anomalies in the Indian Ocean can be attributed to curvature of the surfaces of interfaces between phases under the influence of 2-scale convective flows carrying heat through the entire mantle. Figures 5; references 24: 9 Russian, 15 Western.
[58-6508/12947]

UDC 551.465(261.3)

RELATIONSHIP OF DISTRIBUTION OF HYDROCHEMICAL CHARACTERISTICS TO STRUCTURE AND DYNAMICS OF BALTIC SEA WATERS

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: GEOLOGIYA, GEOGRAFIYA in Russian No 21, Issue 3, Sep 85 (manuscript received 15 Mar 85) pp 115-119

KAZARYAN, V. V., KOROVIN, V. P. and OSIPOV, N. N.

[Abstract] Expeditionary investigations in July-August 1984 studied the relationship among the basic hydrologic and hydrochemical characteristics of water masses in the Baltic Sea in order to determine the possibility of using them as indirect indications of water mass dynamics in the sea. Four standard hydrologic sections were run during the expedition. Data on hydrologic characteristics in the four cross-sections indicate that the hydrochemical characteristics (particularly oxygen) are suitable as indirect indicators of the dynamics and structure of Baltic Sea water masses. This is particularly true of the open regions of the sea, where the influence of biological and biochemical processes is slight. In shallow, well-heated regions the hydrochemical characteristics lose their significance as indicators of water dynamics and structure. In open portions of the sea, oxygen can apparently serve even as a unique characteristic describing the structure of the water masses. Figures 2; references: 3 Russian.
[75-6508/12947]

UDC 551.465+551.456.7(267.3)

MONSOON VARIABILITY OF THERMOHALINE FIELDS AND CIRCULATION OF WATERS IN MAIN PYCNOCLINE IN NORTHWESTERN INDIAN OCEAN

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: GEOLOGIYA, GEOGRAFIYA
in Russian No 21, Issue 3, Sep 85 (manuscript received 18 Mar 85) pp 111-114

KLEPIKOV, V. V. and LOKHITAKSHAN KHARENDU PRAKASH

[Abstract] A study is made of seasonal variability in the water layer of the main pycnocline at 200-800 m depth based on nonaveraged data from deep water oceanographic observations of various expeditions between 1959 and 1977. The depth of isophycnic surfaces changes from season to season. The temperature and salinity of these surfaces are traced. It is concluded that waters in the northwestern Indian Ocean react to the monsoons in the atmosphere down to a depth of 700-800 m and probably deeper. The salinity distribution changes most greatly at isopycnic surfaces corresponding to the core of the intermediate water masses, indicating variability of advection of water from the Persian Gulf and Red Sea, particularly in winter. Figures 2; references 14: 9 Russian, 5 Western.
[75-6508/12947]

UDC 551.35(262.5+262.8)

GEOCHEMICAL CHARACTERISTICS OF AUTHIGENIC IRON SULFIDES IN BLACK AND CASPIAN SEAS

Kiev GEOLOGICHESKIY ZHURNAL in Russian Vol 45, No 5, Sep-Oct 85
(manuscript received 30 Sep 83) pp 116-124

VOLKOVA, T. V. and MITROPOLSKIY, A. Yu., Odessa University imeni I. I. Mechnikov, Odessa; Geological Sciences Institute, Ukrainian Academy of Sciences, Kiev

[Abstract] The study of authigenic iron sulfides in upper Quaternary deposits in the Black and Caspian Seas is doubtlessly significant for determination of the metallogeny of bottom deposits. Since natural sulfides usually contain microscopic impurities whose concentrations depend on conditions of formation and crystallo-chemical specifics of the sulfides, comparison of the complex of microimpurities can be used to determine differences and similarities of composition as functions of formation conditions. Therefore, particular attention is given in this work to the study of the structure and microimpurity composition of iron sulfides. Phase composition was studied by x-ray structural analysis. The microimpurity composition of similar fractions was studied by approximate quantitative spectral analysis. The comparative analysis of microimpurity distribution indicated that Mn, Cu, As, Ni, Co, Mo and Pb are constant microimpurities in both areas. Significant differences were found in the content of these impurities in the Black Sea and Caspian

Sea bottom sediments. Authigenic iron sulfides from Black Sea deposits have the following sequence of elements:

Mn>As>Cu>Ni>Pb>Co>Mo.

In Caspian sediments, the comparable sequence is As>Cu>Mn>Ni>Co>Pb>Mo. In the Black Sea there is a tendency toward lower content of Mn, Cu and As with increasing depth. In the Caspian Sea, the content of Cu, As and Pb varies over a wide range, independently of depth. Iron sulfides from the Black Sea show an Ni/Co ratio of less than 1, indicating sedimentary-diagenetic origin of the sulfides. In the Caspian Sea, Ni/Co = 2.5, indicating an additional influx of metallic materials in the sediment. Figures 5, tables 1; references: 18 Russian.
[56-6508/12947]

UDC 550.361

HEAT FLOW THROUGH BOTTOM IN WESTERN BLACK SEA

Novosibirsk GEOLOGIYA I GEOFIZIKA in Russian No 8, Aug 85 (manuscript received 19 Jun 84) pp 113-123

DUCHKOV, A. D. and KAZANTSEV, S. A., Geology and Geophysics Institute, Siberian Department, USSR Academy of Sciences, Novosibirsk

[Abstract] Results are presented from geothermal studies in the western Black Sea on board the research vessel "Yevpatoriya" in 1981-1983, as well as data from the literature. The geothermal operations included measurement of the temperature of bottom silt, geothermal gradient in the silt, heat conductivity coefficient of the sediment and calculated heat flow through the bottom. The results have significantly improved knowledge of the distribution of the heat flow in the western Black Sea. In addition to 95 previous determinations, some 120 additional ones have been added by the recent cruises. For the first time, the distribution of bottom sediment temperature has been studied over a broad area and large-scale measurement of heat conductivity of bottom silts has been undertaken (over 1,000 determinations). The heat conductivity coefficient was found to vary with moisture content of the sediment. The temperature field of bottom sediment was found to be unsteady down to 400-500 m depth, apparently related to the influence of wind-wave mixing, currents, sediment movement and climatic fluctuations in water temperature. A great area of low heat flow is defined, related to the cooling influence of sediment accumulation in the Pliocene-Quaternary time within the alluvial fan of the ancient Danube. Available materials suggest a comparative homogeneity of heat flow in the western Black Sea of 50-60 mW/m^2 after allowing for sediment accumulation, agreeing with the heat flow of surrounding continental areas. Figures 5, tables 1; references 23: 19 Russian, 4 Western.
[54-6508/12947]

UDC 550.4:661.7

HYDROCARBON GAS-HYDRATE FORMATION BENEATH BOTTOM OF SEAS AND OCEANS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 4, Oct 85
(manuscript received 25 Dec 84) pp 976-978

TROTSYUK, V. Ya., NEMIROVSKAYA, I. A., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] The predictions of the early 1970's that there might be zones of hydrocarbon gas-hydrate formation beneath the ocean floor, a new type of nontraditional fuel-energy resource for the planet, have been confirmed. Data from recent marine expeditions by the authors are presented, indicating that formation of these zones in the ocean is controlled by thermodynamic factors and genetic factors, i.e., the scale of the gas generation processes. The authors' institute undertook gasometric and biogeochemical measurements using sealed sampling devices and high-precision express analyzers as a part of the "Akvaneft" project on the 29th cruise of the "Dmitriy Mendeleyev" in 1982 around the northern rim of the Pacific Ocean in an area selected to determine the nature of hydrocarbon gas saturation of bottom sediments. It is concluded that components migrate into the bottom environment over a focal area, bringing in additional nutrient matter and energy and stimulating the vital activity of microorganisms and resulting in biogenic concentration of organic matter, including hydrocarbon gases. The increase in gas content in deep intervals of sediment columns indicates that in deeper sedimentary horizons under the necessary conditions of temperature and pressure, saturation of polar water with hydrocarbons could occur, creating the genetic conditions for development of gas formation zones. Figures 3; references 7: 4 Russian, 3 Western.
[66-6508/12947]

UDC 550.4.42:551.464.6

CONCENTRATION OF ELEMENTS IN OCEAN AS GEOCHEMICAL FACTOR

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 4, Oct 85
(manuscript received 4 Mar 85) pp 827-830

KORZH, V. D., Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] Results of studies of the content of 53 chemical elements in ocean and river water, determined separately in suspended and dissolved forms, have been published by previous authors. This extensive new material was used by the authors of this article to study the mutual influence of chemical composition of river and ocean water. The elements are graphed in coordinates of $-2 \log (C_A/C_{C1})_{ocean}$ vs. $\log (C_A/C_{C1})_{river}$, in which

coordinates they occupy a strictly limited space enclosed between two straight lines converging at the zero point. The line dividing the angle formed by the coordinate axes in half is the geometric locus of points where the ratios of concentration of elements to concentration of chlorine coincide for sea water and river water. A geochemical model of the ocean is generated in graphic form, revealing the commonality of geochemical properties of elements and allowing their classification as conservative, biogenous and lithogenous. The classifications overlap, P,V and As being conservative biogenous elements, while Cr, Fe, Co, Ga, Sb, Ho, Er, Tm, Yb and Lu are biogenous and lithogenous. Figures 2; references 10: 6 Russian, 4 Western.
[66-6508/12947]

UDC 532

EXAMPLE OF EQUIVALENCY OF DENSITY STRATIFICATION AND ROTATION EFFECTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 2, Sep 85
(manuscript received 21 Mar 84) pp 310-313

VLADIMIROV, V. A., Hydrodynamics Institute imeni A. A. Lavrentyev, Siberian Department, USSR Academy of Sciences, Novosibirsk

[Abstract] A study is made of a class of movement in a rotating fluid closest in its properties to the movement of a stratified fluid. Unstable motion of an incompressible homogeneous ideal fluid is studied in a system of coordinates rotating at a constant rate. The greatest limitation on the analogy between the effects of density stratification and rotation is the difference in the effect of rotation on different movements. This limitation also occurs in other situations, particularly in the problem of stability of flows with helical and circular streamlines. The presence of viscosity is generally speaking a limitation to fruitful application of this analogy. This limitation does not exist, however, in the stability problem. Figures 1; references 14: 7 Russian, 7 Western.
[37-6508/12947]

UDC 551.42

GEOLOGY OF SAN VICENTE ISLAND (CAPE VERDE ARCHIPELAGO)

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 2, Sep 85
(manuscript received 21 Nov 84) pp 419-423

AKHMETYEV, M. A., KOPORULIN, V. I., MAZAROVICH, A. O., RIKHTER, A. V. and FRIKH-KHAR, D. I., Geology Institute, USSR Academy of Sciences; Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry Institute, USSR Academy of Sciences, Moscow

[Abstract] Geological studies were performed in early 1984 by a Soviet team under the leadership of Yu. M. Pushcharovskiy. Geological mapping indicated that San Vicente consists primarily of magmatic rock, the most ancient formations being crystalline rock in the central and northwest portions. Most of San Vicente consists of effusive and pyroclastic formations. This article describes the formations, concluding that the structure of the island was formed in five main phases of island development. During the initial phase, alkaline-ultrabasic magmas intruded, apparently into Jurassic-Cretaceous deposits, producing the first island uplift. During the second and third phases, subaqueous effusive-pyroclastic formations were accumulated. The fourth phase is associated with tectonic-magmatic activation of the region, the formation of fractures, introduction of subvolcanic phonolite and carbonatite bodies, formation of the contemporary relief and discharge of picrite basalts. During the contemporary, fifth phase the volcanic apparatus is forming in the eastern and northeastern portions of the island. Figures 2; references: 2 Western.
[37-6508/12947]

UDC 548.32:539.17

NEW MINERAL VARIETIES OF HYDROTALCITE-MANASOCITE GROUP--PRODUCTS OF LOW-TEMPERATURE CONVERSION OF BASALTS AND VOLCANOGENIC-SEDIMENTARY ROCKS ON OCEAN FLOOR

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 2, Sep 85
(manuscript received 20 Dec 84) pp 443-447

DRITS, V. A., LISITSYNA, N. A. and CHERKASHIN, V. I., Geology Institute, USSR Academy of Sciences, Moscow

[Abstract] This work established for the first time the broad distribution of a group of minerals, the basic structure of which consists of brusite-like layers among products of secondary alteration of basalts and surrounding rock. The minerals are represented by a large group of varieties having unique structural and crystallochemical characteristics. Some of these have not been previously described. The minerals are found in volcanic--sedimentary masses deposited on basalts of the underwater volcanos Atlantis, Ampere and

Josephine in the North Atlantic. Materials for this study were collected during the fourth cruise of the research vessel "Akademik Mstislav Keldysh." A volcanogenic sedimentary mass of Miocene-Quaternary age 50 - 1500 m thick was sampled, consisting of pebble and boulder conglomerates and sandstones with variously altered basalts in a calcareous cementing mass. Ordered mixed stratified formations were found among the varieties studied, the structure of which alternatingly contained sulfate and carbonate-containing gaps between strata. A detailed description of the composition and structure of the volcanogenic-sedimentary rocks is promised for a future publication. The specifics of localization of authigenic minerals lead to the conclusion that the initial material for secondary mineral formation consisted of altered basaltic fragments and hyaloclastites. The major factors determining the possibility of synthesis of hydrotalcite-like minerals are related to the high alkalinity of the medium, intensive removal of such elements as Mg and Al from the basalts, relatively closed nature of the system and mobilization of Mg, SO_4 and CO_3 from sea water. Figures 2, tables 1; references 12: 5 Russian, 7 Western.
[37-6508/12947]

UDC 552.11:552.32

MAGMATISM OF MAJOR OCEAN MORPHOSTRUCTURES AND CERTAIN GEODYNAMIC ASPECTS OF ITS MANIFESTATION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 2, Sep 85
(manuscript received 1 Mar 85) pp 473-477

SHARKOV, Ye. V. and TSVETKOV, A. A., Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry Institute, USSR Academy of Sciences, Moscow

[Abstract] The authors' institute has developed a special program allowing discrimination of magmatic series for various types of geodynamic situations by computer. There are six series in all. The tholeiite and lime-alkaline series are distinguished from subalkaline and alkaline series on a K_2O+Na_2O - SiO_2 graph by the equations: $K_2O+Na_2O = 0.3694\ SiO_2-14.3917$ (where $SiO_2<67\%$) and $K_2O+Na_2O = 7.9205$ (where $SiO_2>67\%$). The tholeiite and lime-alkaline series are separated on the $FeO/MgO-SiO_2$ graph by the equation $FeO^*/MgO=0.1562\ SiO_2 6.685$. Alkaline and subalkaline series are separated on the basis of the absence in the former and presence in the latter of normative feldspar derivatives leucite and nepheline. The K-Na and K sequences of subalkaline and alkaline series are separated on the basis of the relationship of alkalis. The magmatic series developed in the ocean are analogous to magmatic series in continental rift areas and continental intraplate magmatism with the exception of the specific oceanic basalts in the axial portions of the mid-oceanic ridges and specific continental K-alkaline series. This indicates basic similarity of the matter of the upper mantle where melting foci are located under both continental and oceanic segments. References 10: 5 Russian, 5 Western.
[37-6508/12947]

UDC 550.347.42

NORTH ATLANTIC UPPER MANTLE HETEROGENEITIES

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 9, Sep 85 (manuscript received 5 Mar 84) pp 23-35

KUNIN, N. Ya., and USENKO, S. V., Earth Physics Institute, USSR Academy of Sciences

[Abstract] It is demonstrated that in much of the North Atlantic elastic wave boundary velocity values remain constant on profiles with differing orientation. Studies of the anisotropy of elastic wave boundary velocities are not useful in such areas. Regionalization of the North Atlantic based on these velocity values reveals three major areas differing in mean and modal velocities and distribution of velocities. It is found that heat flow, gravity anomalies and regional anomalies of the geoid correlate with these three areas, probably reflecting large lateral heterogeneities in the upper mantle, though they do not coincide with the continental margins or mid-oceanic ridge boundaries. The results are compared with regionalization of other geophysical parameters. The upper mantle of the North Atlantic and adjacent continental areas can be characterized by a single zonality, the areas distinguished in the homogeneous mantle generally continuing beyond the limits of the continents essentially unchanged. Figures 4, tables 1; references 36: 17 Russian, 19 Western.
[60-6508/12947]

UDC 550.360(267)

GEOTHERMAL STUDIES IN CENTRAL INDIAN OCEAN BASIN

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 9, Sep 85 (manuscript received 30 Jul 84) pp 110-112

VANYAN, L. L., GORODNITSKIY, A. M., PALSHIN, N. A. and SHILOVSKIY, P. P., Oceanology Institute, USSR Academy of Sciences

[Abstract] The 31st cruise of the research vessel "Dmitriy Mendeleyev" undertook three measurements of heat flow near an anomalous zone extending in a northwestly direction over Afanasiya Nikitina seamount from 80 to 88°E, an area in which heat flow density increases to 100-200 mW/m^2, two to four times the background values. Two-dimensional numerical modeling with the finite elements method showed no significant distortions in the calculated heat flow density to the southwest of the anomalous zone. As concerns the northeastern margin, the tapering of the sedimentary cover near the extensive seamount creates heat flow density anomalies. However, due to the great thickness of bottom sediments, these anomalies are not great. Numerical modeling thus gives no reason to consider the increased heat flow values to be the result of distortions in contrast heat conductivity. The very high heat flow values density obtained in this region correspond to a geothermal

gradient of 100° per kilometer, which should result in melting at a depth of about 12-13 km if conductive heat transfer is predominant. Figures 1; references: 2 Russian.
[60-6508/12947]

UDC 517.911

SCATTERING MATRIX AND INTEGRABILITY OF CLASSICAL WAVE SYSTEMS WITH ADDITIONAL MOTION INTEGRAL

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 283, No 6, Aug 85 (manuscript received 6 Dec 84) pp 1325-1328

ZAKHAROV, V. Ye., corresponding member, USSR Academy of Sciences, and SHULMAN, Ye. I., Theoretical Physics Institute imeni L. D. Landau, USSR Academy of Sciences, Chernogolovka, Moscow Oblast; Water Problems Institute, USSR Academy of Sciences, Moscow

[Abstract] Results are presented concerning Hamiltonian systems with an infinite number of degrees of freedom describing nonlinear waves from the physical standpoint. Classical wave systems in an infinite medium with translational symmetry and described in a k-space by a unique complex function are considered. The results obtained are easily extended to Hamiltonians of general form. If H_{int} does not contain terms cubic with respect to $a_k(t)$, decay processes are impossible and dispersion is always nondegenerate unless it is a homogeneous function of the first power. References 4: 1 Russian, 3 Western.
[45-6508/12947]

UDC 577.3:534.2

POSSIBILITIES OF ACOUSTIC THERMOGRAPHY OF BIOLOGICAL OBJECTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 283, No 6, Aug 85 (manuscript received 5 Mar 85) pp 1495-1499

GULYAYEV, Yu. V., academician, GODIK, E. E., DEMENTIYENKO, V. V., PASECHNIK, V. I. and RUBTSOV, A. A., Radio Engineering and Electronics Institute, USSR Academy of Sciences, Moscow

[Abstract] A study is made of a new method of determining the spatial distribution of temperatures within the depth of a biological object, based on its thermal acoustic emission. Acoustic waves at 1 to 10 MHz pass easily through most biological materials and have a wavelength of but a few millimeters, meaning they have good spatial resolution. Quantitative estimates are given of the sensitivity and resolution of acoustic thermography, which are compared with the parameters of radio thermography. When a matrix receiver

is used, acoustic thermography has significant advantages for precise location of depth and boundaries of deep heat sources such as tumors, inflammation foci, etc. An additional advantage of acoustic thermography is the simplicity of technical implementation of multispectral probing, required to ascertain the distribution of temperature with depth. Figures 3; references 7: 3 Russian, 4 Western.
[45-6508/12947]

UDC 911.2:551.35+551.46

MARINE LANDSCAPE STUDIES: NEW APPROACH TO STUDY OF OCEAN ENVIRONMENT

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOGRAFICHESKAYA in Russian No 5, Sep-Oct 85 (manuscript received 8 Apr 85) pp 5-14

GERSHANOVICH, D. Ye. and FEDOROV, V. V., All-Union Marine Fisheries and Oceanography Scientific Research Institute

[Abstract] A brief review is presented of the application of landscape studies, well-developed on land, to the study of the characteristics of the ocean, particularly the ocean floor. A bottom landscape is a finite element in a system with unilateral flow of matter and energy. The significance of interaction between systems on the bottom and near the bottom has been determined to be quite great. The problem of studying ocean floor landscapes can be solved completely only by continued development and practical introduction of submarine technology. The capacity of humans to actually see the bottom with their own eyes is a necessary part of this technology. A diagram illustrates several types of underwater studies and the equipment utilized, including scuba, unmanned instrumented devices and manned submersibles. Figures 3; references 25: 24 Russian, 1 Western.
[74-6508/12947]

TERRESTRIAL GEOPHYSICS

ACTIVE KAMCHATKA VOLCANO STUDIED

Moscow TASS International Service in Russian 1318 GMT 14 Dec 85

[Article: "Tents by the River of Fire"]

[Text] Petropavlovsk-Kamchatskiy, 14 Dec (TASS). Soviet scientists have set up camp in tents near a fire-spitting lava flow on the side of one of the greatest active volcanoes in Eurasia, Klyuchevskiy, on the Kamchatka Peninsula (northeastern USSR). An expedition from the Volcanology Institute of the Far Eastern Scientific Center, USSR Academy of Sciences, will explore the consequences of the powerful explosions which took place at an elevation of 2½ km as a result of the interaction of ice and lava, thousands of degrees hot, which erupted from the crater's peak. The scientists from different disciplines--geologists, geochemists and geophysicists--will also study the nature and processes of the present volcanic eruption.

The expedition landing was preceded by a helicopter flight around the active volcano undertaken by a team of scientists. They recorded lava eruptions from the crater, which are sliding in three fiery flows along the slopes of the snow-covered volcano, causing mud flows. The ash and rock eruptions are reaching a height of 2 km. However, there is no threat to the town lying 30 km away from the eruption.

Every second the volcano, which arose roughly 8,000 years ago, is receiving about 2 metric tons of magma from the depths, said Professor Sergey Fedotov, director of the Institute of Volcanology. As a result of such an intensive upheaval of material to the surface, a mountain almost 5 km high has formed in that time. This is already the second eruption this year through the peak crater, although there are frequent eruptions through the side breaches on the slopes. According to the estimates made during the scientists' flight, ash alone is now being ejected at a rate faster than 10 metric tons a second, and lava is being ejected at no less than 50 metric tons a second.

/12947
CSO: 1865/201-E

SEISMIC PROSPECTING WITHOUT BLASTING TESTED

Moscow TASS in Russian 23 Dec 85

[Text] Tests of Seismokod units, developed by scientists in Kharkov (the Ukraine) for geological survey of the earth's depths without explosions, have been completed, MN INFORMATION writes. The unit, mounted on a motor vehicle, sends into the depths in accordance with a set schedule, a series of powerful mechanical pulses--200 in 10 seconds. The resultant seismic waves penetrate several kilometers deep and return to the surface. Sensitive instruments record them and transmit them to a computer. Having processed the data, the computer produces the characteristics of the geological section of the earth's layers and makes it possible to determine the sites for drilling prospecting holes.

/12947
CSO: 1865/201-E

UDC 550.83:550.814:551.24

STRUCTURAL ELEMENTS ON KAMCHATKA REVEALED BY ANOMALOUS MAGNETIC FIELD

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 85
(manuscript recevied 17 Jun 83) pp 26-33

ZIMIN, V. M., Kamchatgeologiya, Petropavlovsk-Kamchatskiy

[Abstract] A new interpretation of the anomalous magnetic field of Kamchatka has been made. The author analyzed a map of ΔT_a isodynes compiled in 1970 and transformed to 1:200,000 scale. The result of the analysis is a structural diagram of regionalization of the ΔT_a field, showing ten regions. The ten regions are described and a geological interpretation of the aeromagnetic data is presented for each. The major feature of the anomalous magnetic field is the northeast (Kuril-Kamchatka) strike of the anomalous regions, which agree with elements of the geological structure and structural plan of the peninsula. There is close correlation between ΔT_a field elements and elements of the structural plan on the peninsula, with Paleogene formations of the island-arc stage of regional development playing an important role. The ΔT_a field reflects circular structures of various ranks, the largest reaching 300 km in diameter. Figures 1; references: 5 Russian.
[67-6508/12947]

UDC 550.837

LAYERS OF INCREASED CONDUCTIVITY IN CRUST AND UPPER MANTLE BENEATH KAMCHATKA

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 9, Sep 85
(manuscript received 21 Nov 84) pp 61-69

MOROZ, Yu. F., Volconology Institute, USSR Academy of Sciences

[Abstract] Analysis of magnetotelluric sounding data for Kamchatka indicate characteristic forms of longitudinal curves. These are grouped into sets corresponding to regions with different deep geoelectric cross-sections. The middle curves of the sets are combined into groups corresponding to large zones with various deep geoelectric cross-sections. Differences in deep geoelectric cross-section are reflected in the tectonics, magmatism, heat

field and hydrothermal activity. The deep geoelectric model of Kamchatka proposed summarizes the electromagnetic research done in the area. Geoelectric and geothermal cross-sections of the area are presented. Figures 5; references 15: 14 Russian, 1 Western.
[60-6508/12947]

UDC 551.596.1:551.463.21

SOUND FIELD OF A POINT SOURCE IN STRATIFIED MOVING TWO-COMPONENT MEDIUM

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian Vol 21, No 9, Sep 85 (manuscript received 13 Mar 84) pp 949-955

OSTASHEV, V. Ye., Atmospheric Physics Institute, USSR Academy of Sciences

[Abstract] A method developed in two previous works for computation of sound pressure in a stratified ideally moving gas is extended to the case of a moving two-component medium. As an example of the use of the equations thus obtained, the field of a point source in a moving medium is analyzed. The problem of computing sound pressure in a stratified moving two-component medium is reduced to solution of a one-dimensional Helmholz equation and subsequent computation of a Fourier integral. References 7: 6 Russian, 1 Western.
[70-6508/12947]

UDC 551.521.3

TRANSFER OF RADIATION IN MODEL OF BROKEN CLOUD COVER CONSTRUCTED ON THE BASIS OF POISSON POINT FLUX

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian Vol 21, No 9, Sep 85 (manuscript received 19 Jan 84) pp 940-948

TITOV, G. A., Atmospheric Optics Institute, Siberian Department, USSR Academy of Sciences

[Abstract] Based on results obtained in a previous work, this article describes the transfer of optical radiation in a model of broken cloud cover with the Markov property in the direction of movement of a light quantum. Equations are derived for the moments of optical parameters in the statistically homogeneous, nonisotropic cloud field, which is modeled by a Poisson flow of points. In deriving the equation for moments of intensity in the Markov approximation with respect to statistical characteristics of the cloud field, the only assumption was factorization of n-point probability of presence of clouds for an ordered sequence of points on a single straight line. The

results indicate that the mean radiation characteristics of a statistically homogeneous, nonisotropic cloud field depend not only on the probability of presence and horizontal dimension of clouds, but also on the nature of anisotropy and amount of cloud cover. Figures 6; references: 11 Russian.
[70-6508/12947]

UDC 551.521.31

LIGHT SCATTERING IN ATMOSPHERE WITH NONORTHOTROPIC UNDERLYING SURFACE

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 9, Sep 85 (manuscript received 8 Feb 84) pp 928-933

ZUBOV, V. A. and MININ, I. N., Leningrad State University

[Abstract] Usually when solving problems related to light scattering in the atmosphere it is assumed that the surface of the planet is orthotropic, the intensity of light reflected from the surface not depending on direction. Actual surfaces have complex light reflection patterns. The main purpose of this article is quantitative estimation of the variation from orthotropicity and formulation of conclusions and practical recommendations for such problems. The basic integral equations required for the analysis are derived and solved for several model cases. Recommendations for calculating gradient influx are presented. References 13: 11 Russian, 2 Western.
[70-6508/12947]

UDC 551.510.42:519.688

PLANNING OF EXPERIMENT IN PROBLEM OF ESTIMATING INTENSITY OF POLLUTION SOURCES

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ATMOSFERY I OKEANA in Russian
Vol 21, No 9, Sep 85 (manuscript received 11 Nov 83; after revision 4 Apr 84)
pp 913-920

PENENKO, V. V., RAPUTA, V. F. and BYKOV, A. V., Computer Center, Siberian Department, USSR Academy of Sciences

[Abstract] A study is made of one element in an air pollution tracking system, an algorithm for estimating the output of pollution sources based on measurement data. A development and continuation of previous work, the article presents more complete regression models taking various hydrometeorological conditions into account. Methods are suggested for constructing continuous and discrete plans for the class of problems arising on the basis of pollutant transfer models. Numerical experiments are presented in the area of determining optimal measurement plans. The method suggested is of greatest interest for estimating the output of sources which are not accessible for direct observation, e.g., in problems of transfer of pollutants across borders,

as well as analysis of sources of complex configuration. The apparatus developed in this article can also be used for problems requiring joint determination of the position and output power of pollution sources. Figures 2, tables 2; references: 7 Russian.
[70-6508/12947]

ARCTIC AND ANTARCTIC RESEARCH

UDC 551.464.1

HYDROCHEMICAL INDICATORS OF FRONTAL CYCLONIC EDDY IN ANTARCTIC CIRCUMPOLAR CURRENT

Moscow OKEANOLOGIYA in Russian Vol 25, No 5, Sep-Oct 85
(manuscript received 5 Oct 83) pp 740-743

CHERNYAKOVA, A. M. and BORODKIN, S. O., Oceanology Institute imeni
P. P. Shirshov, USSR Academy of Sciences, Moscow

[Abstract] The 30th cruise of the research vessel "Dmitriy Mendeleyev" studied synoptic variability of physical, chemical and biological parameters in sea water in relationship to eddy formation in the area of the Antarctic Circumpolar Current south of New Zealand. Analysis of the materials revealed an eddy formation, a cyclonic frontal ring, its area of formation and the evolution of its waters in time and space. The frontal cyclone was formed by separation of a meander of the southern branch of the Antarctic Circumpolar Current, then moved under the influence of the average current to the northeast, carrying an Antarctic water mass in its core. Meandering of the current is primarily related to bottom topography and is a constant source of eddies. Figures 4; references 3: 2 Russian, 1 Western.
[72-6508/12947]

UDC 550.83

RELATIONSHIP OF ELASTIC MODULI OF MOISTURE-SATURATED FROZEN SANDY-CLAYEY ROCKS AND ICE

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA in
Russian No 8, Aug 85 pp 85-89

FROLOV, A. D., Moscow Geological Prospecting Institute imeni Sergo
Ordzhonokidze

[Abstract] Data are compared on the elastic properties of frozen sandy-clayey soils with full moisture saturation and porosity 40%, the level most frequently encountered in nature, and massive cryotexture. The influence of different types of cryotexture on the elastic modulus of frozen rock is not analyzed.

It is found that at temperatures below -2°C, Young's modulus for frozen sands is 3.3-4 times greater than for fresh water ice. This is a result of the formation in the frozen sand of a three-dimensional biogenic structure with predominance of crystallization-condensation contacts betweeen grains, due to the very low content of liquid phase in the frozen sands at temperatures below -2 or -3°C and the significantly smaller crystal size of the ice than in solid ice bodies. For clayey soils and saline ice, it is found that at -2 to -10°C the elastic modulus of clayey rock is significantly less than that for polycrystalline ice, resulting from the significant content of adsorbed liquid phase in the intergrain boundary zones. The interval of change of the elastic modulus in polycrystalline fresh water ice can be used to evaluate the elastic properties of moisture-saturated frozen rock and saline ice. Figures 1; references 14: 8 Russian, 6 Western.
[32-6508/12947]

UDC 539.383

IMPACT FRACTURE OF ICE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 3, Sep 85
(manuscript received 30 Oct 84) pp 599-603

YEPIFANOV, V. P., Mechanical Problems Institute, USSR Academy of Sciences, Moscow

[Abstract] A study is made of the collision of an ice plate with a spherical body. A new experimental method allows determination not only of the mechanical characteristics, but also of their changes in the process of the collision, and interchangeable fittings allow modeling of the impact interaction of engineering structures with an ice field. Experiments on the influence of temperature on the mechanism of penetration of a sphere into ice were performed at -1 to -40°C. The method allows an impact during the course of which the nature of the interaction changes, e. g., by formation of fractures. Figures 4; references 4: 3 Russian, 1 Western.
[64-6508/12947]

UDC 552.578.1/2(9)

GEODYNAMIC RECONSTRUCTIONS AS METHOD FOR PREDICTING OIL AND GAS CONTENT OF POORLY STUDIED REGIONS (AS EXEMPLIFIED BY ANTARCTIC)

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA GEOLOGICHESKAYA in Russian No 9, Sep 85 (manuscript received 23 Jan 85) pp 100-110

ALIYEVA, Ye. R. and KUCHERUK, Ye. V., Moscow State University, All-Union Institute of Scientific and Technical Information, Moscow

[Abstract] Geodynamic reconstruction based on plate tectonics, in contrast to other geological analogy geological methods, allows the drawing of conclusions not only on the current status, but also the history of geological development of a region. This article demonstrates the capabilities and limitations of application of the method in the example of the least studied continent, Antarctica. The broad stratigraphic diversity of the sedimentary cover, great thickness of sediments and presumably great variety of conditions for oil and gas formation and accumulation, allow the shelf and transition zones of the Weddell Sea to be considered among the most highly promising in the Antarctic for the search for oil and gas. The use of the geodynamic reconstruction method based on lithospheric plate tectonics, even when direct correlation across the ocean is impossible, allows general prediction of the types of basins of poorly studied Antarctic continental margins, the specifics of their geological structure, age and nature of sedimentation and possible conditions of oil and gas formation. This allows orientation of prospecting, particularly geophysical, work in the search for submerged rift-stage grabens and other sedimentary complexes. Horst upthrusts of the basement and certain characteristic structures forming potential traps for hydrocarbons are defined, such as horst and monoclinal basement blocks in rift depressions. Figures 1; references 36: 8 Russian, 28 Western.
[59-6508/12947]

NEW ARCTIC DRIFTING STATION, SP-28, PLANNED

Moscow IZVESTIYA in Russian 29 Nov 85 p 1

[Article by A. Ryabushev, Leningrad]

[Text] The USSR State Committee on Hydrometeorology and Monitoring of the Natural Environment, and the Central Committee of the All-Union Leninist Communist Youth League (Komsomol) have adopted a decision to create the third Komsomol drifting scientific research station. It will be the station "Severnyy Polyus-28" (SP-28).

"The creation of the drifting scientific research station 'SP-28', at which scientific observations will be extensively automated, is very essential, and it will open up great prospects," said Nikolay Aleksandrovich Korniiov, deputy director of the Arctic and Antarctic Scientific Research Institute. "Its work will become an important part of Arctic exploration in the spirit of the program 'Intensifikatsiya-90'. Preparations are now in full swing for an upcoming winter mission by young polar explorers. A long-term agreement regarding the development of automated complexes and their introduction at drifting stations has been concluded with the Leningrad Polytechnic Institute. The creation of an automatic post for receiving and transmitting satellite information on ice conditions is also planned at 'SP-28'. The compilation and facsimile transmission of a map of the ice conditions of the entire Arctic basin will be done with the aid of a computer for the first time at a drifting station."

FTD/SNAP
/12947
CSO: 1865/116

DIVERS IN PRESSURE CHAMBER ON BOARD VESSEL 'SPRUT'

Moscow MEDITSINSKAYA GAZETA in Russian 18 Dec 85 p 4

[Text] An interesting experiment was performed in the Barents Sea. Specialists of the diving vessel "Sprut" descended to a record depth of 300 meters and carried out all planned work successfully. This vessel's divers worked in support of geologists who are doing exploratory drilling in the coastal zone of Arctic seas.

Hurricane-force winds, movements of ice masses and other natural factors can cause various breakdowns of drilling mechanisms, and such breakdowns have to be eliminated at various depths. Training dives must be made constantly under careful medical observation if work is to be done in such conditions. Divers of the vessel spent several days in a pressure chamber in maximum-load conditions before making their record dive.

(The photograph showed divers under the observation of physician B. Vlasov in a pressure chamber of the "Sprut", following the record dive.)

FTD/SNAP
/12947
CSO: 1865/116

IL-18D AIRPLANE USED IN ANTARCTIC EXPLORATION AND TRANSPORT

Moscow VOZDUSHNYY TRANSPORT in Russian 21 Dec 85 p 2

[Article by T. Nikitina, correspondent]

[Excerpt] An IL-18D airplane [which recently returned to Leningrad] performed a good deal of service over the expanses of the Antarctic continent. Equipped with special instruments, it acquired a new occupation: it was used as a laboratory airplane. With the assistance of a crew headed by V. Shapkin, scientists of the USSR Academy of Sciences' "Sevmorgeologiya" (Northern Marine Geology) Research and Production Association and other organizations made comprehensive studies of interior areas of the continent that are difficult to reach. Many of these areas are convered with a layer of ice that is one kilometer thick. The use of the IL-18D as a laboratory airplane proved highly effective, making it possible to study large territories in a comparatively short period of time and to obtain valuable scientific data. Specialists of "Sevmorgeologiya" reported that this work will be advanced on a broader scale in the future, which will undoubtedly enrich our knowledge of the sixth continent.

In the fall of 1985, part of the polar explorers arrived in Maputo, Mozambique, from Moscow on a commercial flight of a TU-154 airplane. They then boarded the IL-18D, which made four more shuttle flights between the capital of Mozambique and the Antarctic station "Molodezhnaya", delivering another 160 members of the expedition to this station. More than 1,000 persons in all have been transported over this long-distance route during the [four] years it has been in operation.

The next flight over this super-long route of Aeroflot is planned in February of 1986. Instead of an IL-18D, a more modern IL-76 airplane, which has been re-outfitted as a passenger version, will set out for the first time over the long route to the sixth continent. A large new group of participants in the 31st Antarctic Expedition will leave for Antarctica on board the IL-76.

FTD/SNAP
/12947
CSO: 1865/116

SP-28 ARCTIC DRIFTING STATION TO START OPERATION IN APRIL

Moscow SOVETSKAYA ROSSIYA in Russian 28 Dec 85 p 2

[Article by I. Podshivalov]

[Excerpt] Next spring, the scientific research station "Severnyy Polyus-28" will begin operation in the Arctic Ocean. It is being established at the initiative of Young Communist League (Komsomol) members who work at the Arctic and Antarctic Scientific Research Institute.

For the first time a minicomputer will be used on a drifting ice floe as the basis of a flexible automated complex for the gathering, processing and systematization of scientific observations. Meteorologists, oceanologists, an ice research group, aerologists, a satellite-information receiving service, and a climate and ocean-pollution monitoring service will be operating at the station. The results of the studies will contribute to the establishment of year-round shipping on the Northern Sea Route, and to the solution of certain problems related to the development of geological prospecting operations on the ocean shelf.

At present, as preparations are underway, the search for an ice floe is being conducted; the "Cosmos-1500" satellite is being used in this search. The Komsomol has assumed patronage of the enterprises which are producing the equipment for the SP-28 station, which will begin its work in April.

FTD/SNAP
/12947
CSO: 1865/154

- END -